

高中化学方程式总结

高中化学方程式总结

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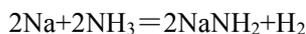
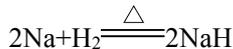
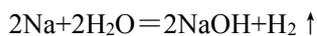
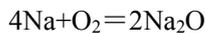
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第一部分 金属

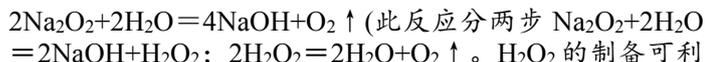
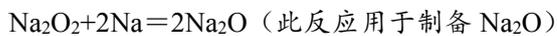
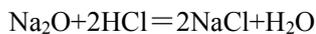
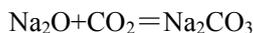
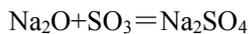
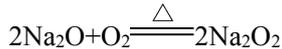
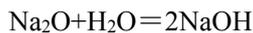
一、碱金属

1. 钠

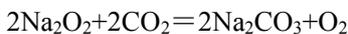
Na



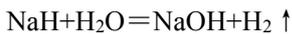
Na₂O



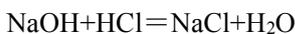
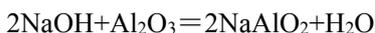
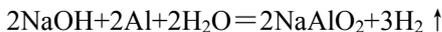
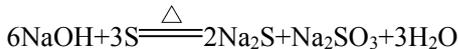
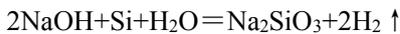
用类似的反应)

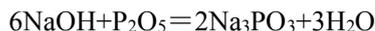
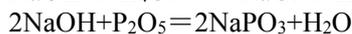
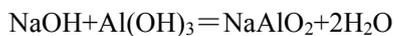


NaH

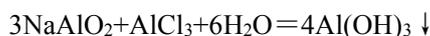
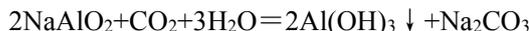


NaOH

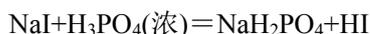
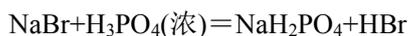
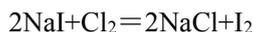
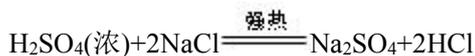




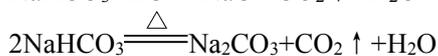
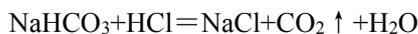
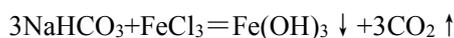
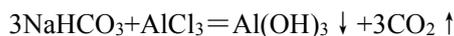
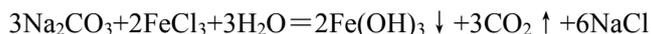
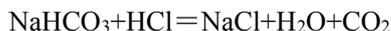
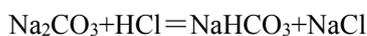
NaAlO₂



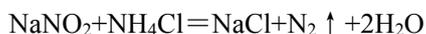
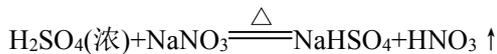
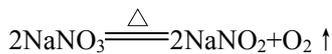
NaCl、NaClO、NaBr、NaI



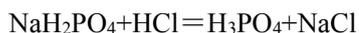
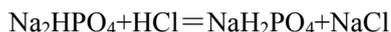
Na₂CO₃、NaHCO₃



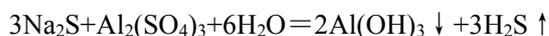
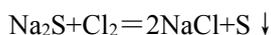
NaNO₃、NaNO₂



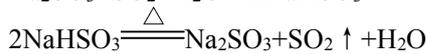
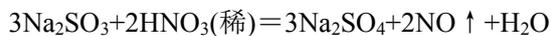
Na₃PO₄、NaH₂PO₄、Na₂HPO₄



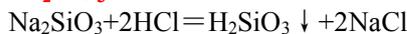
Na₂S、NaHS



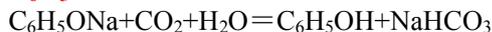
Na₂SO₄、Na₂SO₃、Na₂S₂O₃



Na₂SiO₃

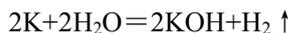


C₆H₅ONa

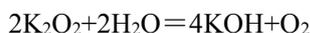
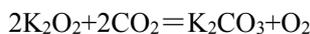
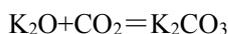
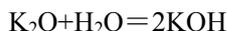


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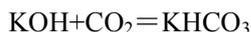
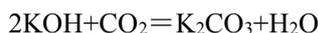
K



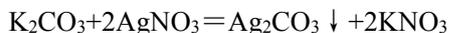
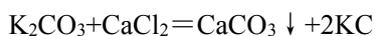
K₂O、K₂O₂



KOH



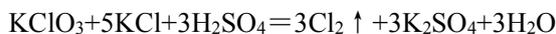
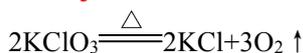
K₂CO₃



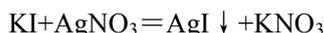
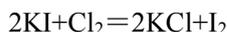
KHCO₃



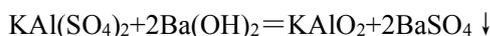
KClO₃



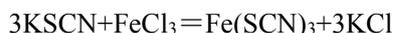
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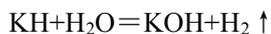
KAl(SO₄)₂



KSCN

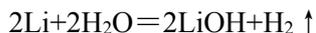
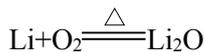


KH

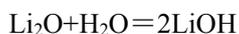
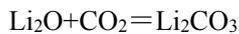


3. 锂

Li



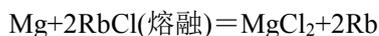
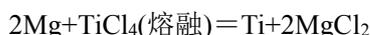
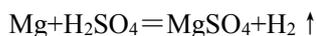
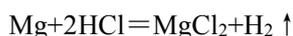
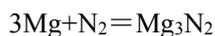
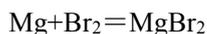
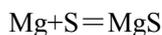
Li₂O



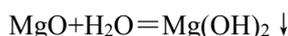
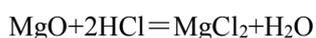
二、常见金属

1. 镁

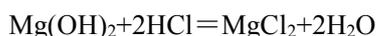
Mg



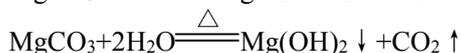
MgO



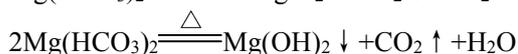
Mg(OH)₂



MgCO₃



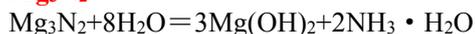
Mg(HCO₃)₂



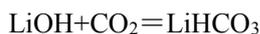
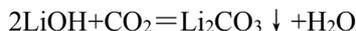
MgSO₄



Mg₃N₂



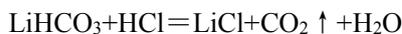
LiOH



Li₂CO₃

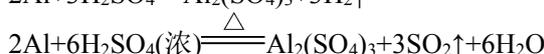
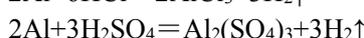
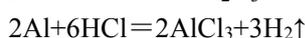
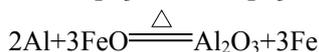
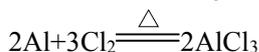


LiHCO₃



2. 铝

Al

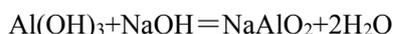
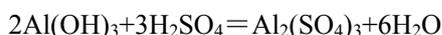
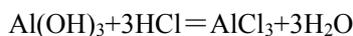
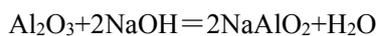


$\text{Al} + 4\text{HNO}_3(\text{稀}) = \text{Al}(\text{NO}_3)_3 + \text{NO} \uparrow + 2\text{H}_2\text{O}$ (Al、Fe 在冷、浓的 H_2SO_4 、 HNO_3 中钝化)

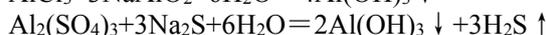
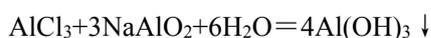
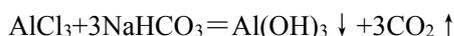
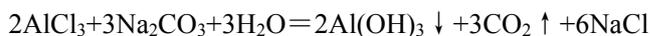
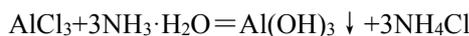


Al₂O₃、Al(OH)₃

$\text{Al}_2\text{O}_3 + 3\text{H}_2\text{SO}_4 = \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2\text{O}$ (Al_2O_3 是两性氧化物)

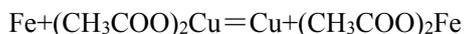
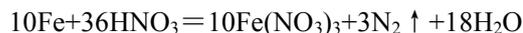
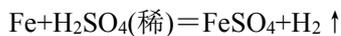
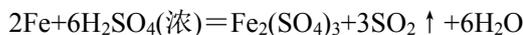
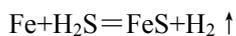
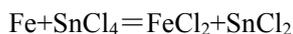
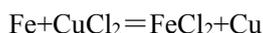
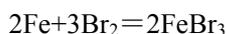
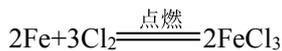


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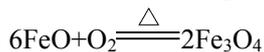
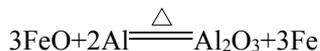


3. 铁

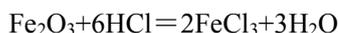
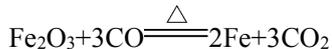
Fe



FeO



Fe₂O₃



Fe₃O₄

三、其他金属

1. 锰

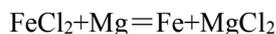
KMnO₄



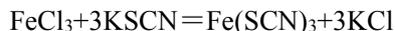
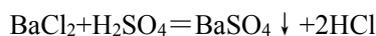
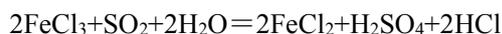
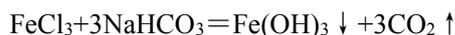
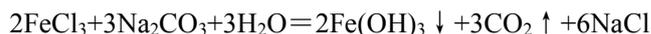
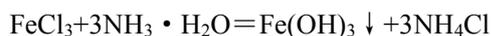
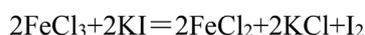
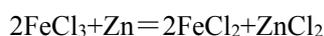
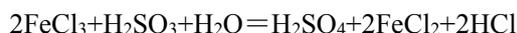
Fe(OH)₂、Fe(OH)₃



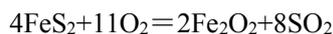
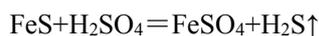
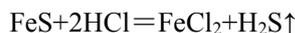
FeCl₂



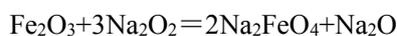
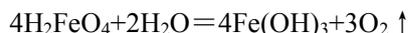
FeCl₃



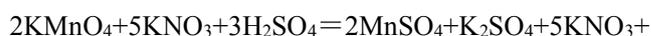
FeS



H₂FeO₄



其它 Fe 化合物

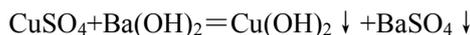
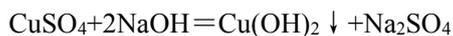
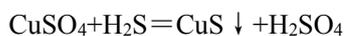
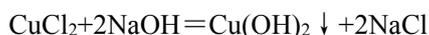
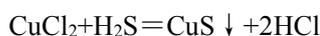
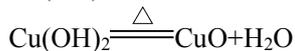
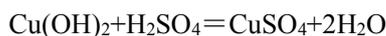
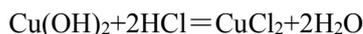
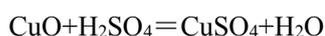
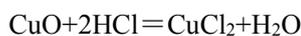
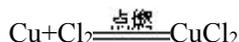
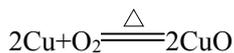


MnO₂



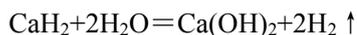
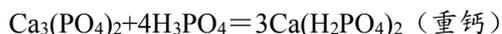
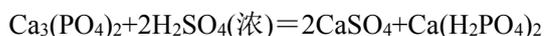
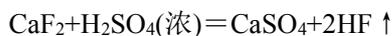
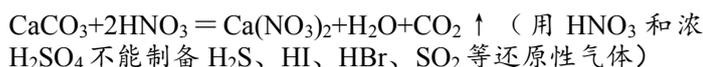
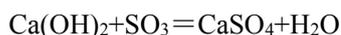
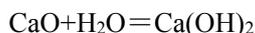
2. 铜

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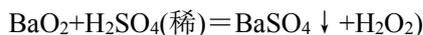
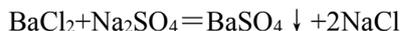
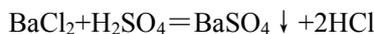
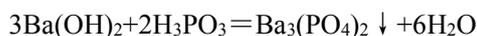
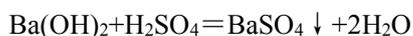
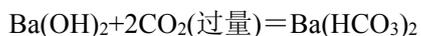
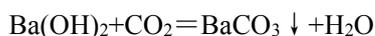
3. 钙

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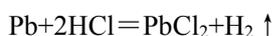
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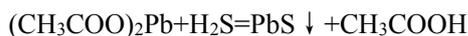
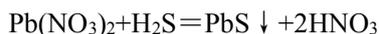


5. 铅

Pb、PbO₂

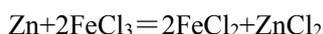
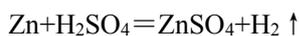
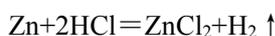


铅盐

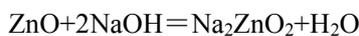
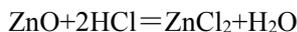


6. 锌

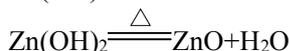
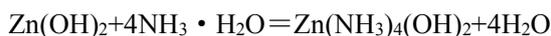
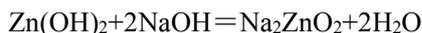
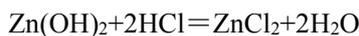
Zn



ZnO

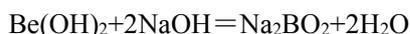
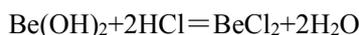
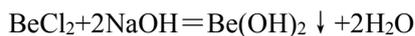
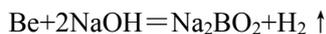
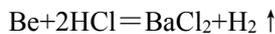


Zn(OH)₂



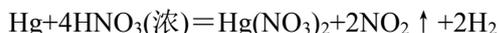
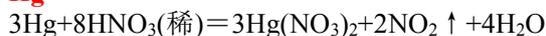
7. 铍

Be



8. 汞

Hg

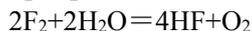
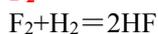


第二部分 卤族元素、氮族元素

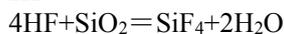
一、卤族元素

1. 氟

F_2

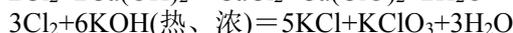
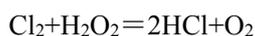
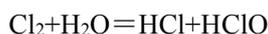
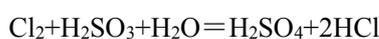
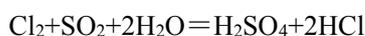
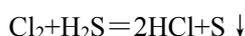
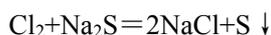
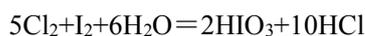
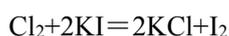
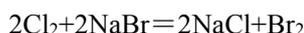
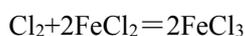
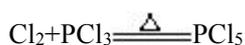


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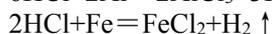
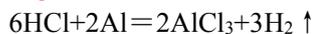


2. 氯

Cl_2



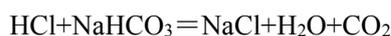
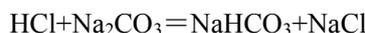
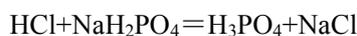
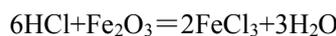
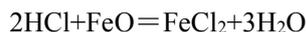
HCl



二、氮族元素

1. 氮

N_2

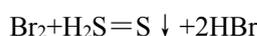
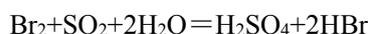
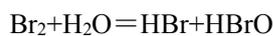
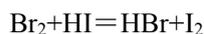
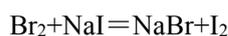
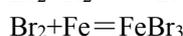
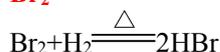


$HClO$

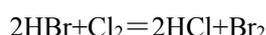
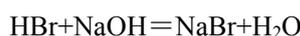


3. 溴

Br_2



HBr

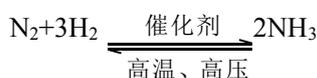
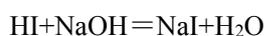
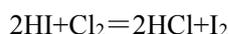
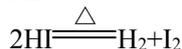


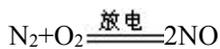
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I_2

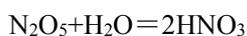
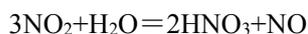
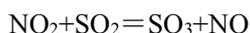
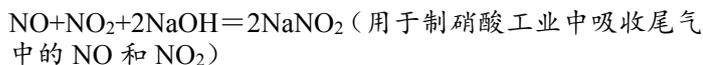
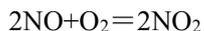


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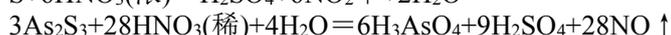
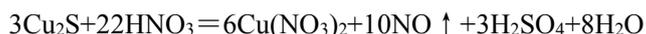
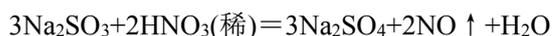
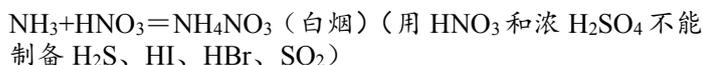
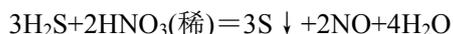
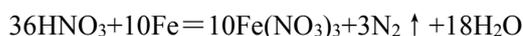
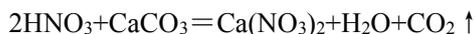
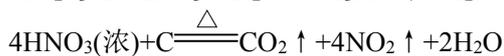
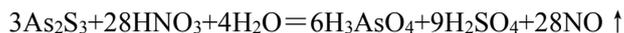
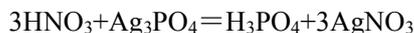




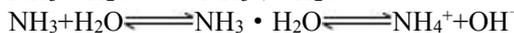
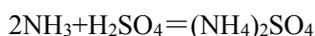
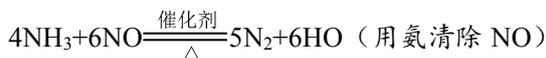
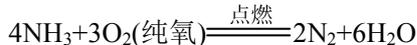
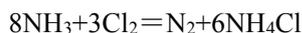
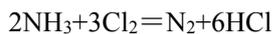
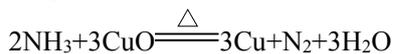
NO、NO₂、N₂O₅



HNO₃



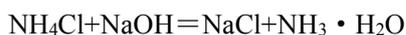
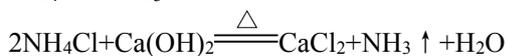
NH₃



NH₄HCO₃、(NH₄)₂CO₃



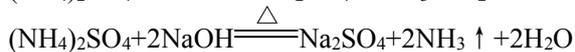
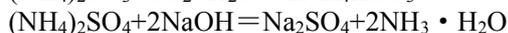
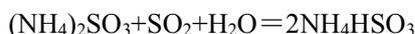
NH₄Cl



NH₄NO₃

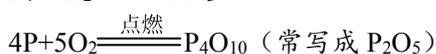
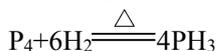
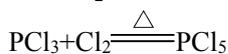


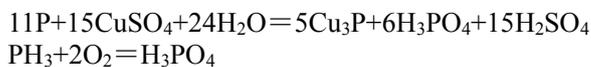
(NH₄)₂SO₃、(NH₄)₂SO₄



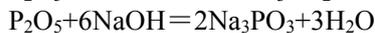
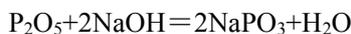
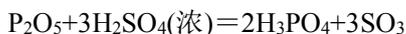
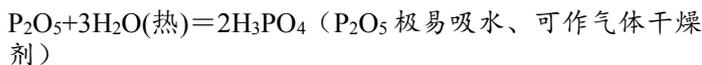
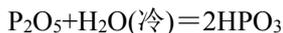
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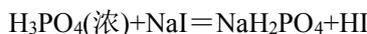
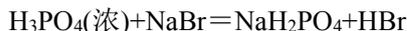
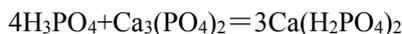




P₂O₃、P₂O₅、P₄S₃



H₃PO₄

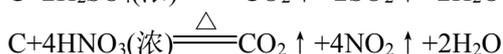
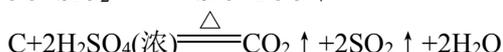
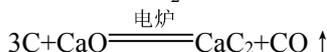
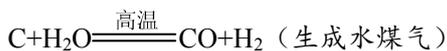
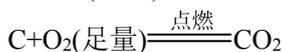
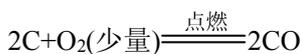
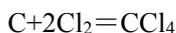
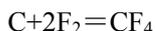


第三部分 碳族元素、氧族元素

一、碳族元素

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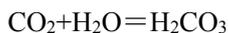
C



CO



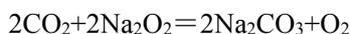
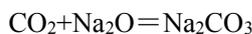
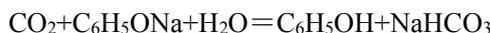
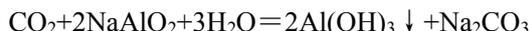
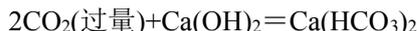
CO₂



二、氧族元素

1. 氧

O₂

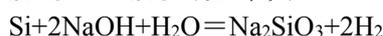
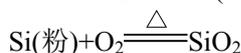
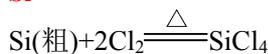


H₂CO₃

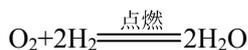
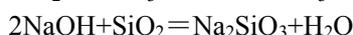
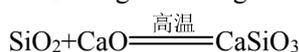
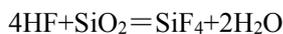
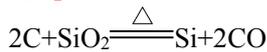


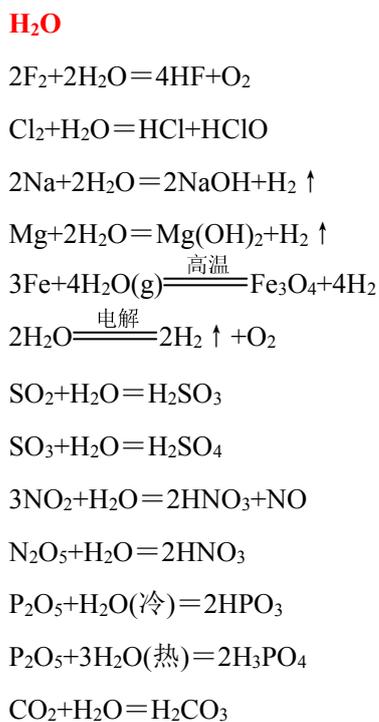
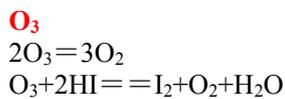
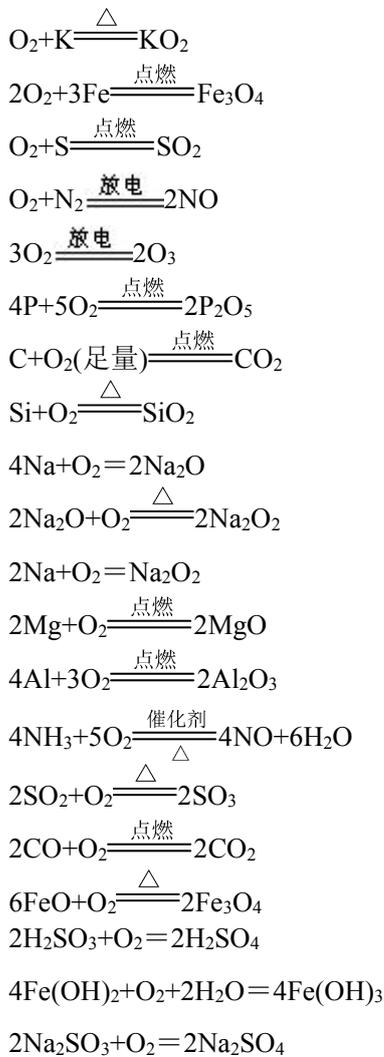
2. 硅

Si

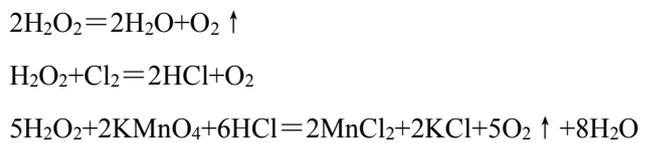


SiO₂

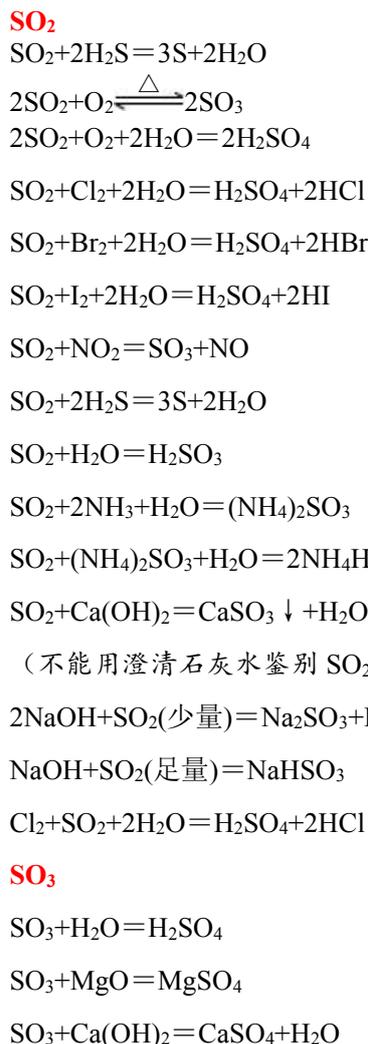
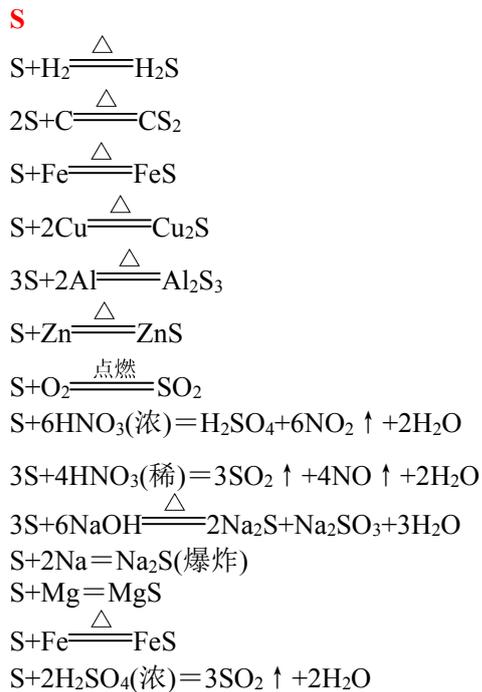


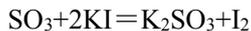
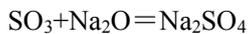


H₂O₂

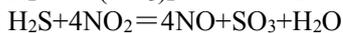
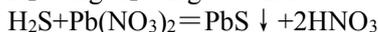
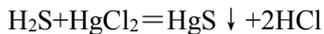
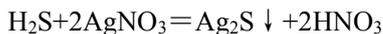
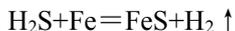
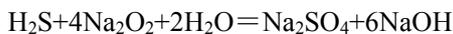
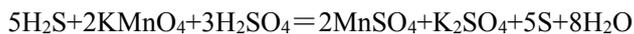
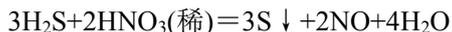
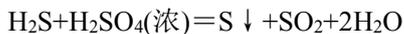
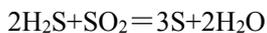
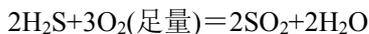
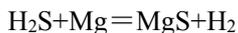
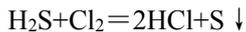


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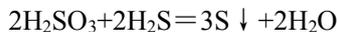
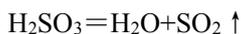
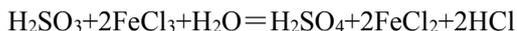
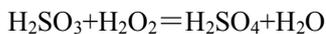
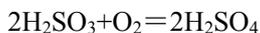




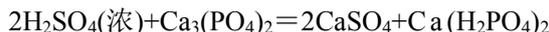
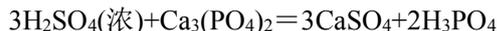
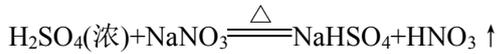
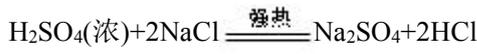
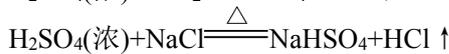
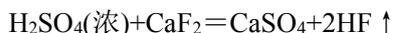
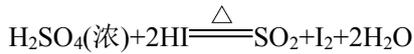
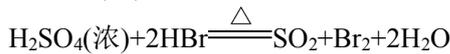
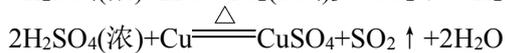
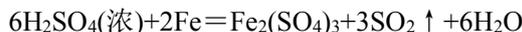
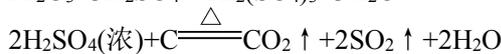
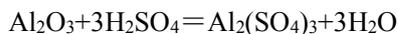
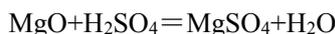
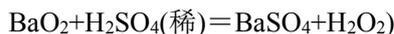
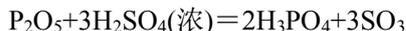
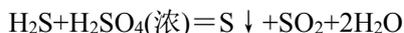
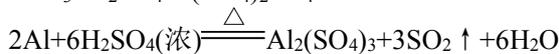
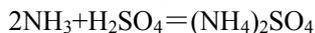
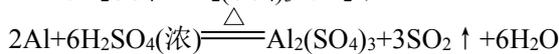
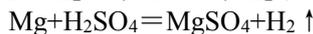
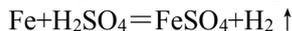
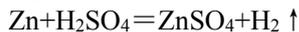
H₂S



H₂SO₃



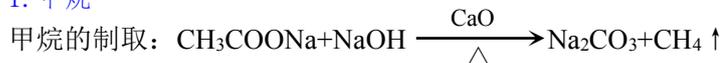
H₂SO₄



第四部分 有机反应

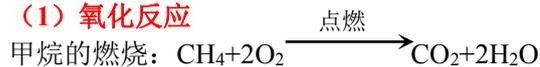
一、烃

1. 甲烷



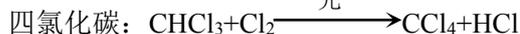
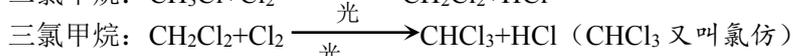
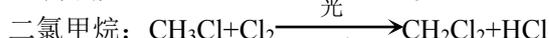
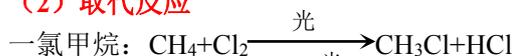
烷烃通式: $\text{C}_n\text{H}_{2n-2}$

(1) 氧化反应



甲烷不可使酸性高锰酸钾溶液及溴水褪色。

(2) 取代反应



(3) 分解反应

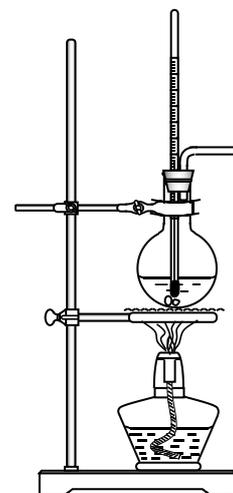
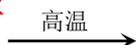


图1 乙烯的制取

甲烷分解： $\text{CH}_4 \xrightarrow{\text{C}+2\text{H}_2}$

2. 乙烯

乙烯的制取： $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[170^\circ\text{C}]{\text{浓硫酸}} \text{H}_2\text{C}=\text{CH}_2 \uparrow + \text{H}_2\text{O}$

烯烃通式： C_nH_{2n}

(1) 氧化反应

乙烯的燃烧： $\text{H}_2\text{C}=\text{CH}_2 + 3\text{O}_2 \xrightarrow{\text{高温}} 2\text{CO}_2 + 2\text{H}_2\text{O}$

乙烯可以使酸性高锰酸钾溶液褪色，发生氧化反应。

(2) 加成反应

与溴水加成： $\text{H}_2\text{C}=\text{CH}_2 + \text{Br}_2 \longrightarrow \text{CH}_2\text{Br}-\text{CH}_2\text{Br}$

与氢气加成： $\text{H}_2\text{C}=\text{CH}_2 + \text{H}_2 \xrightarrow[\Delta]{\text{催化剂}} \text{CH}_3\text{CH}_3$

与氯化氢加成： $\text{H}_2\text{C}=\text{CH}_2 + \text{HCl} \xrightarrow{\Delta} \text{CH}_3\text{CH}_2\text{Cl}$

与水加成： $\text{H}_2\text{C}=\text{CH}_2 + \text{H}_2\text{O} \longrightarrow \text{CH}_3\text{CH}_2\text{OH}$

(3) 聚合反应

乙烯加聚，生成聚乙烯： $n \text{H}_2\text{C}=\text{CH}_2 \xrightarrow{\text{一定条件}} \left[\text{CH}_2-\text{CH}_2 \right]_n$

3. 乙炔

乙炔的制取： $\text{CaC}_2 + 2\text{H}_2\text{O} \longrightarrow \text{HC}\equiv\text{CH} \uparrow + \text{Ca}(\text{OH})_2$

炔烃的通式： $\text{C}_n\text{H}_{2n-2}$

(1) 氧化反应

乙炔的燃烧： $\text{HC}\equiv\text{CH} + 5\text{O}_2 \xrightarrow{\text{点燃}} 4\text{CO}_2 + 2\text{H}_2\text{O}$

乙炔可以使酸性高锰酸钾溶液褪色，发生氧化反应。

(2) 加成反应

与溴水加成： $\text{HC}\equiv\text{CH} + \text{Br}_2 \longrightarrow \begin{array}{c} \text{HC}=\text{CH} \\ | \quad | \\ \text{Br} \quad \text{Br} \end{array}$

$\text{CHBr}=\text{CHBr} + \text{Br}_2 \longrightarrow \text{CHBr}_2-\text{CHBr}_2$

与氢气加成： $\text{HC}\equiv\text{CH} + \text{H}_2 \xrightarrow{\text{催化剂}} \text{H}_2\text{C}=\text{CH}_2$

与氯化氢加成： $\text{HC}\equiv\text{CH} + \text{HCl} \xrightarrow[\Delta]{\text{催化剂}} \text{CH}_2=\text{CHCl}$

(3) 聚合反应

氯乙烯加聚，得到聚氯乙烯： $n \text{CH}_2=\text{CHCl} \xrightarrow{\text{一定条件}} \left[\text{CH}_2-\overset{\text{Cl}}{\underset{|}{\text{CH}}} \right]_n$

乙炔加聚，得到聚乙炔： $n \text{HC}\equiv\text{CH} \xrightarrow{\text{一定条件}} \left[\text{CH}=\text{CH} \right]_n$

4. 苯

苯的同系物通式： $\text{C}_n\text{H}_{2n-6}$

(1) 氧化反应

苯的燃烧： $2\text{C}_6\text{H}_6 + 15\text{O}_2 \xrightarrow{\text{点燃}} 12\text{CO}_2 + 6\text{H}_2\text{O}$

苯不能使溴水和酸性高锰酸钾溶液褪色。

(2) 取代反应

① 苯与溴反应

 + Br₂ $\xrightarrow{\text{Fe}}$  + HBr (溴苯)

② 硝化反应

 + HO-NO₂ $\xrightarrow[60^\circ\text{C}]{\text{浓 H}_2\text{SO}_4}$  + H₂O (硝基苯)

苯硝化反应生成硝基苯，它是一种带有苦杏仁味、无色油状液体，有毒。

③ 磺化反应

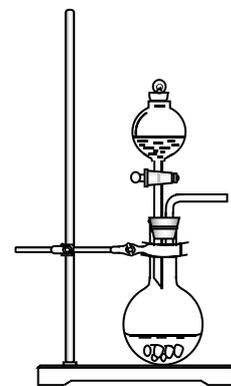
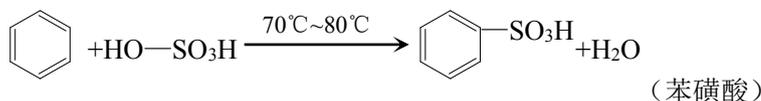
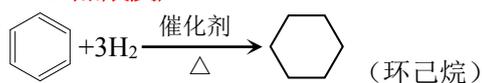


图2 乙炔的制取

注意：制取乙烯、乙炔均用排水法收集；乙烯、乙炔的加成反应一般都需要催化剂（溴除外）。



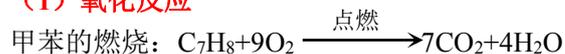
(3) 加成反应



苯还可以和氯气在紫外光照射下发生加成反应，生成 $\text{C}_6\text{H}_6\text{Cl}_6$ (剧毒农药)。

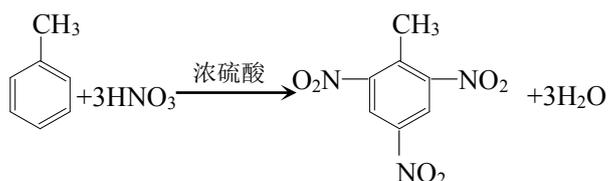
5. 甲苯

(1) 氧化反应

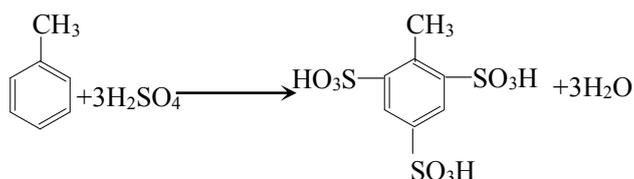


甲苯不能使溴水褪色，但可以使酸性高锰酸钾溶液褪色。

(2) 取代反应

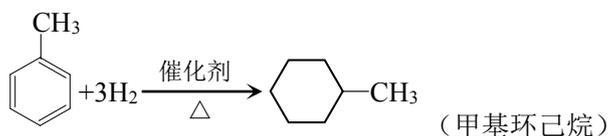


甲苯硝化反应生成 2, 4, 6-三硝基甲苯，简称三硝基甲苯，又叫梯恩梯 (TNT)，是一种淡黄色晶体，不溶于水。它是一种烈性炸药，广泛用于国防、开矿等。



注意：甲苯在光照条件下发生侧链的取代，而在催化剂条件下发生苯环上的取代。

(3) 加成反应



二、烃的衍生物

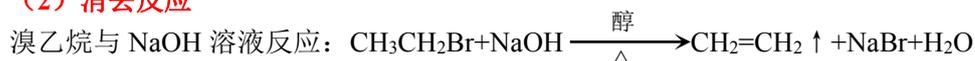
6. 溴乙烷

纯净的溴乙烷是无色液体，沸点 38.4°C ，密度比水大。

(1) 取代反应



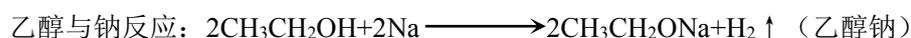
(2) 消去反应



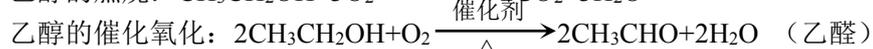
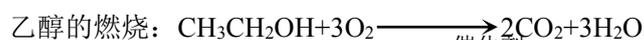
注意：检验卤代烃中的卤原子时，需取水解液滴入 HNO_3 酸化，再滴加 AgNO_3 溶液。一是中和多余的 NaOH ，二则检验沉淀是否溶于稀硝酸。

7. 乙醇

(1) 与钠反应



(2) 氧化反应

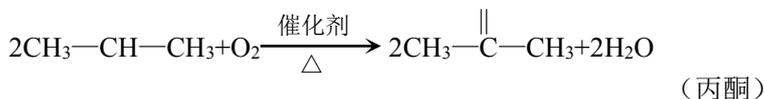


注意：当 2-丙醇发生催化氧化时，会生成丙酮，而非丙醛。



○ 高中化学方程式总结，第 13 页，共 23 页

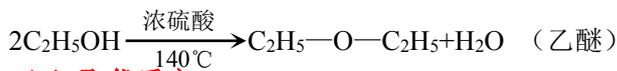
注意：甲醇、乙醇为可再生能源，甲醇有毒；乙二醇和丙三醇无色、粘稠、有甜味、与水和酒精以任意比互溶，丙三醇 (甘油) 还有护肤作用。



(3) 消去反应

乙醇在浓硫酸作催化剂的条件下，加热到 170℃ 生成乙烯。

注意：该反应加热到 140℃ 时，乙醇进行另一种脱水方式，生成乙醚。



(4) 取代反应

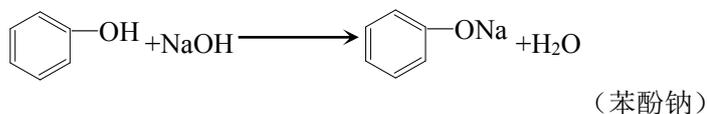


注意：乙醇不可以和卤素单质发生取代反应。

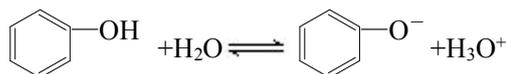
8. 苯酚

苯酚是无色晶体，露置在空气中会因氧化显粉红色。苯酚具有特殊的气味，熔点 43℃，水中溶解度不大，易溶于有机溶剂。苯酚有毒，是一种重要的化工原料。

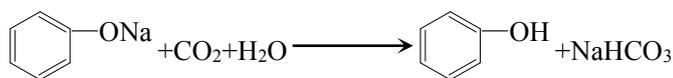
(1) 苯酚的酸性



苯酚（俗称石炭酸）的电离：

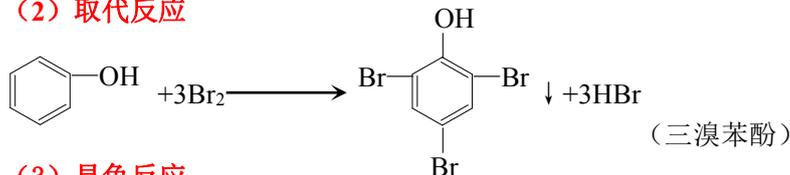


苯酚钠与 CO₂ 反应：



注意：该反应只能生成 NaHCO₃，因为 HCO₃⁻ 酸性弱于苯酚。

(2) 取代反应



(3) 显色反应

苯酚能和 FeCl₃ 溶液反应，使溶液呈紫色。

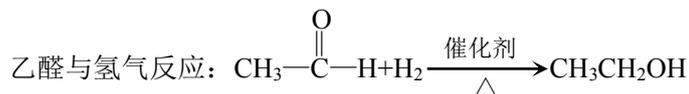
注意：凡是含有羟基的有机物，一般均可与钠反应。

溴水与酚类易取代，不易加成，且易在苯环邻、对位上取代。

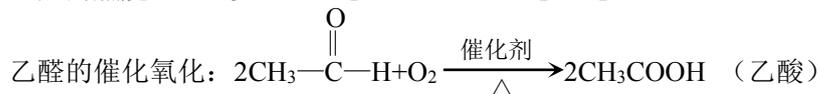
9. 乙醛

乙醛是无色，具有刺激性气味的液体，沸点 20.8℃，密度比水小，易挥发。

(1) 加成反应



(2) 氧化反应

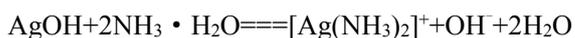
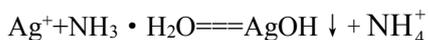


乙醛的银镜反应：

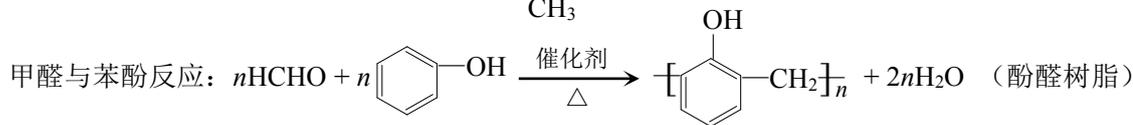


注意：硝酸银与氨水配制而成的银氨溶液中含有 Ag(NH₃)₂OH（氢氧化二氨合银），

这是一种弱氧化剂，可以氧化乙醛，生成 Ag。有关制备的方程式：



(3)

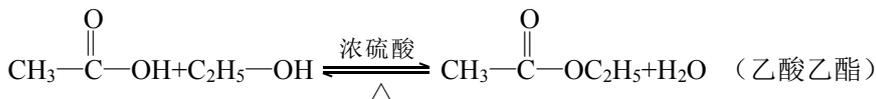


10. 乙酸

(1) 乙酸的酸性



(2) 酯化反应

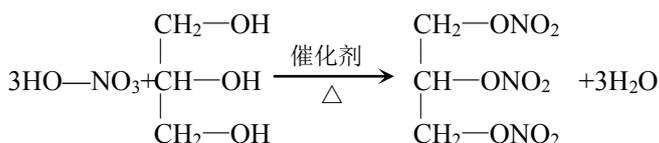


注意：酸和醇起作用，生成酯和水的反应叫做酯化反应。

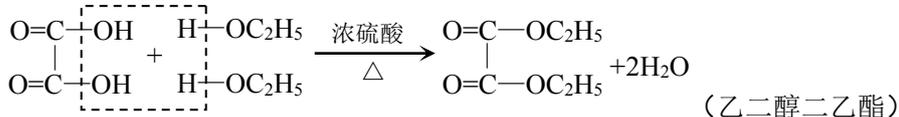
附加：酯化反应简介

(1) 反应条件：一般需加热，用浓硫酸作催化剂和吸水剂。

(2) 反应物：醇是任意的醇，酸既可以是有机酸，也可以是无机含氧酸。如：



(3) 反应机理：一般是羧酸脱羟基醇脱氢，且羧基与醇羟基数目比为 1:1。如：

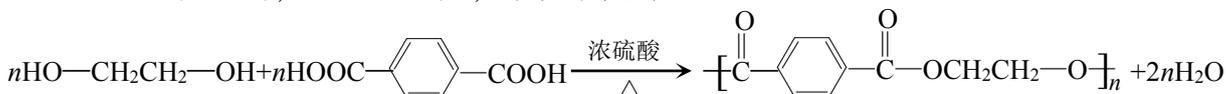


(4) 反应方式

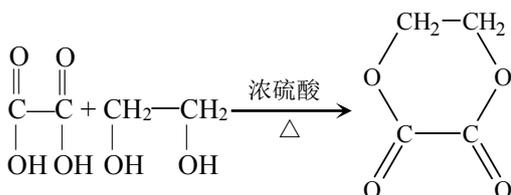
<1>一元醇与一元羧酸按通式反应：



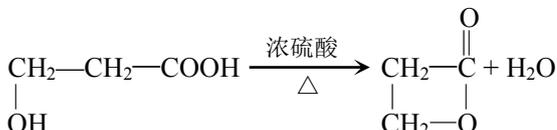
<2>二元羧酸与二元醇，可以酯化成链，并形成高分子化合物。如：



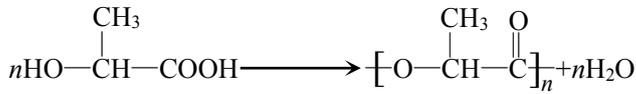
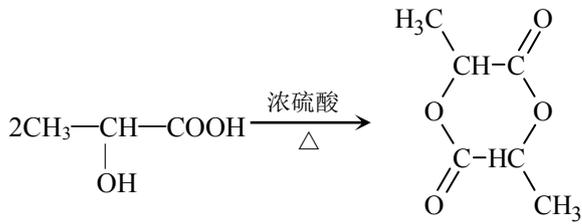
也可酯化成环状小分子酯。



<3>羟基羧酸可自身酯化成环状内酯。如：



也可分子间酯化形成环状小分子酯或链状高分子化合物(酯)，如：



11. 乙酸乙酯

乙酸乙酯是一种带有香味的无色油状液体。

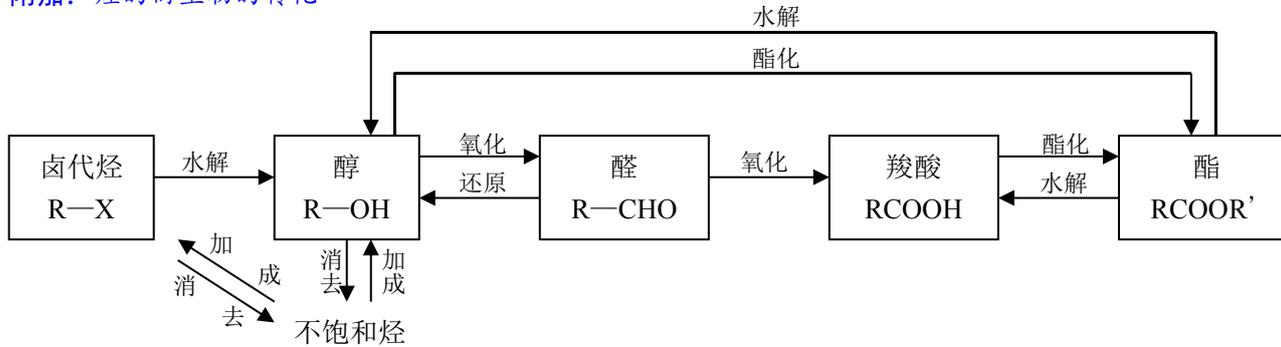
(1) 水解反应



(2) 中和反应



附加：烃的衍生物的转化



三、糖类、油脂、蛋白质

12. 葡萄糖

结构： $\text{CH}_2\text{OH}-\text{CHOH}-\text{CHOH}-\text{CHOH}-\text{CHOH}-\text{CHO}$

物理性质：白色晶体，易溶于水，有甜味。

化学性质：①具有还原性：能发生银镜反应，能与新制的氢氧化铜反应；②加成

反应：与 H_2 反应；③酯化反应：与羧酸反应；④分解反应：在酒化酶作用下，分

解为乙醇和 CO_2 ；⑤燃烧生成 CO_2 和 H_2O 。

葡萄糖的燃烧： $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

葡萄糖的氧化： $\text{CH}_2\text{OH}(\text{CHOH})_4\text{CHO} + 2\text{Ag}(\text{NH}_3)_2\text{OH} \xrightarrow{\Delta} \text{CH}_2\text{OH}(\text{CHOH})_4\text{COONH}_4 + 2\text{Ag} \downarrow + 3\text{NH}_3 + \text{H}_2\text{O}$

$\text{CH}_2\text{OH}(\text{CHOH})_4\text{CHO} + 2\text{Cu}(\text{OH})_2 \xrightarrow{\Delta} \text{CH}_2\text{OH}(\text{CHOH})_4\text{COOH} + \text{Cu}_2\text{O} \downarrow + 2\text{H}_2\text{O}$

葡萄糖的还原： $\text{CH}_2\text{OH}(\text{CHOH})_4 + \text{H}_2 \xrightarrow[\Delta]{\text{催化剂}} \text{CH}_2\text{OH}(\text{CHOH})_4\text{CH}_2\text{OH}$

葡萄糖的分解： $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{催化剂}} 2\text{CH}_3\text{CH}_2\text{OH} + 2\text{CO}_2$

13. 蔗糖、麦芽糖

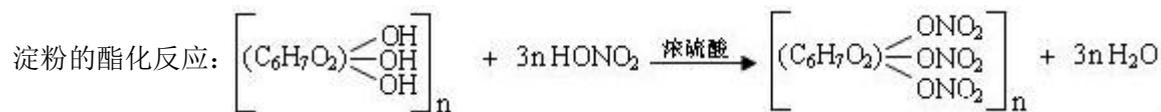
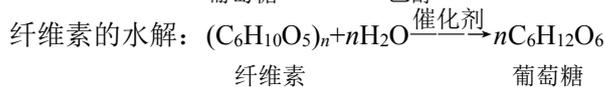
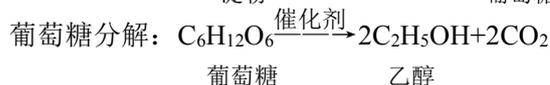
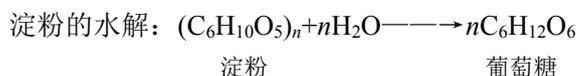
蔗糖的水解： $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \xrightarrow{\text{催化剂}} \text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6$
 蔗糖 葡萄糖 果糖

麦芽糖的水解： $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \xrightarrow{\text{催化剂}} 2\text{C}_6\text{H}_{12}\text{O}_6$
 麦芽糖 葡萄糖

注意：蔗糖不含醛基，不可以发生银镜反应；麦芽糖可以发生银镜反应。

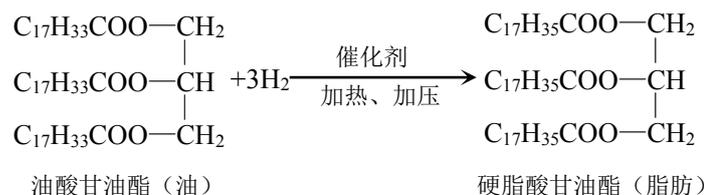
14. 淀粉、纤维素

催化剂

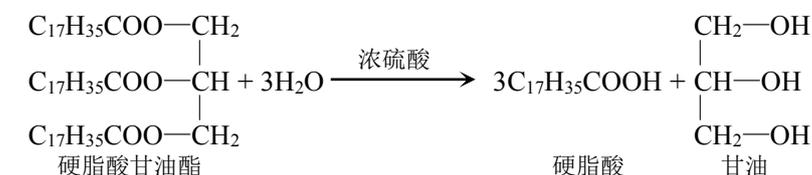


15. 油脂

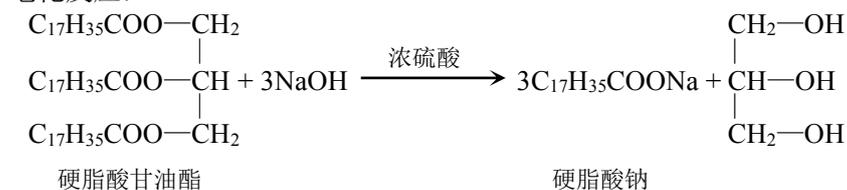
(1) 氢化反应



(2) 水解反应

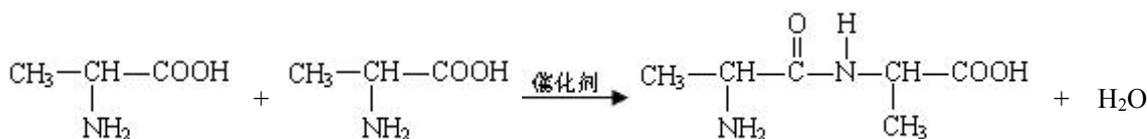
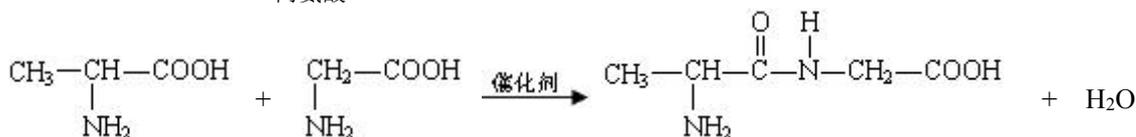
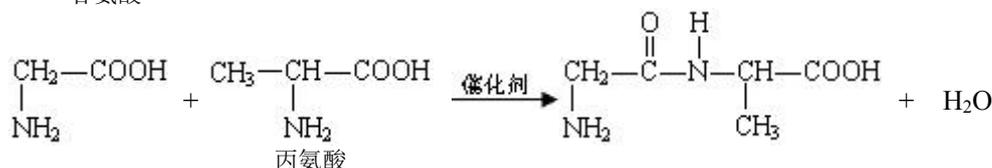
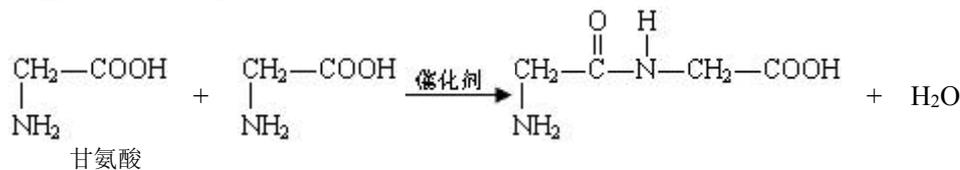


皂化反应:



16. 氨基酸

氨基酸中的 $-NH_2$ 和 $-COOH$ 发生脱水缩合,生成多肽。

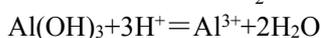
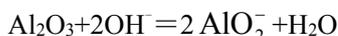
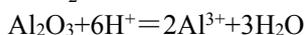
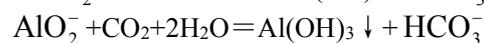
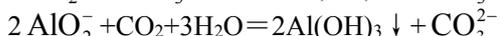
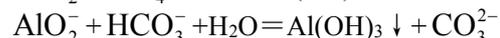
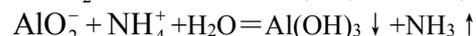
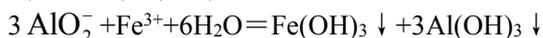
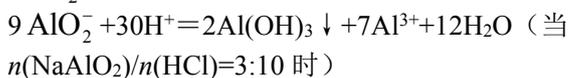
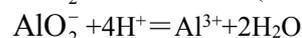
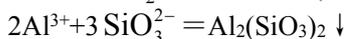
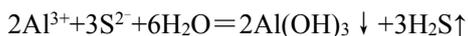
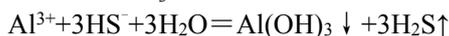
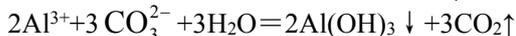
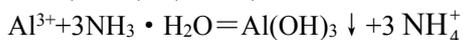
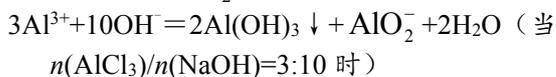
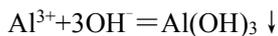
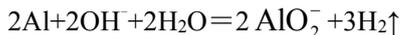
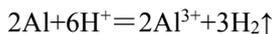


(两种不同的氨基酸进行缩合,可产生4种不同的多肽)

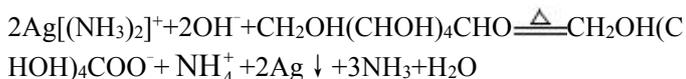
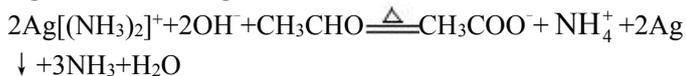
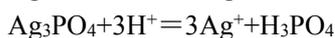
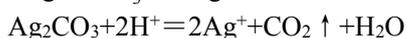
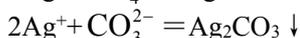
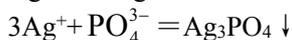
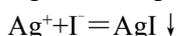
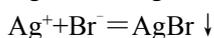
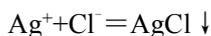
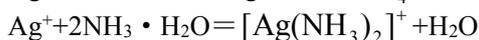
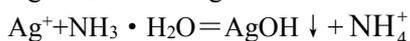
第五部分 离子反应

(按字母顺序排列)

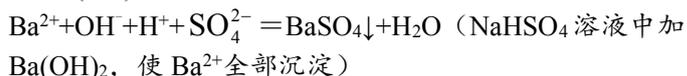
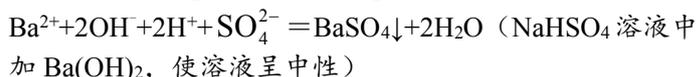
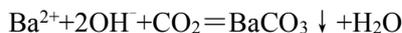
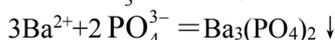
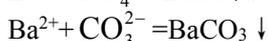
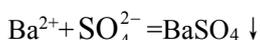
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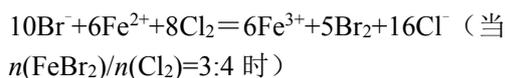
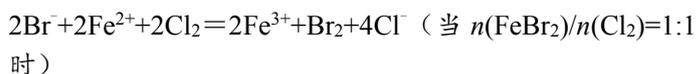
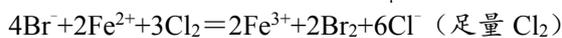
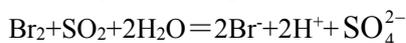
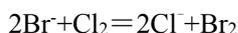
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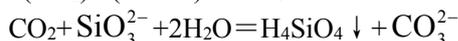
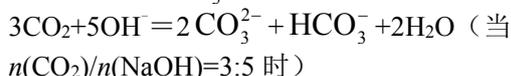
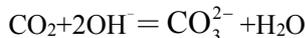
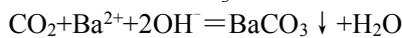
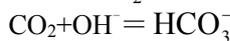
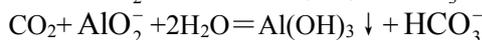
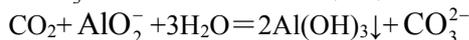
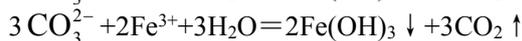
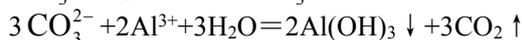
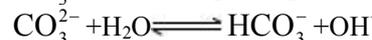
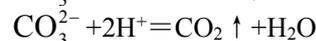
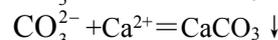
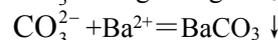
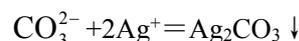
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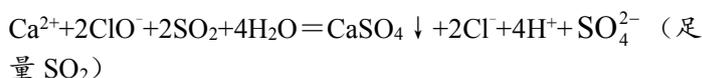
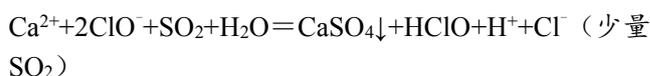
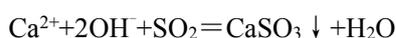
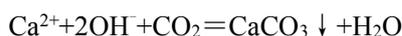
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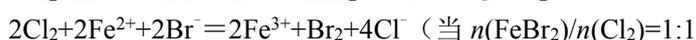
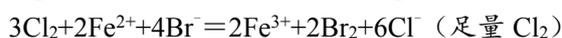
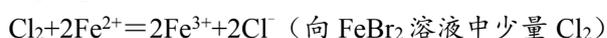
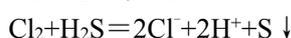
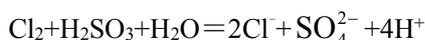
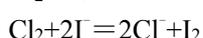
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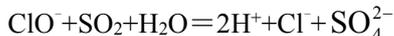
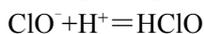
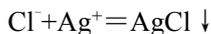
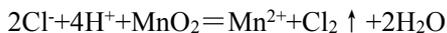
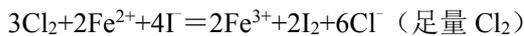
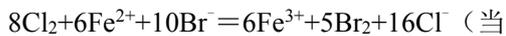
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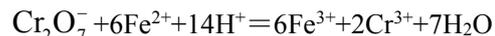
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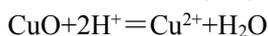
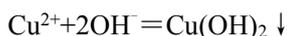
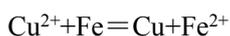
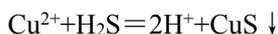
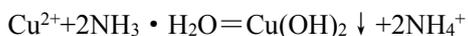
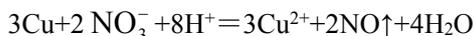
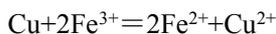
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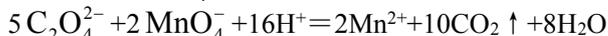
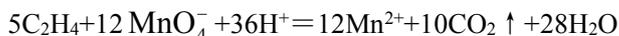
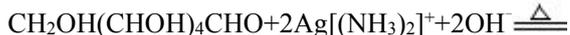
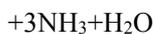
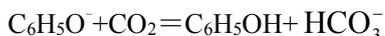
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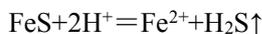
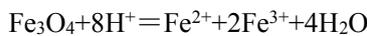
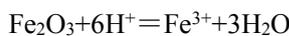
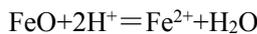
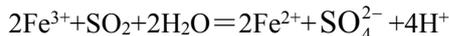
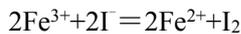
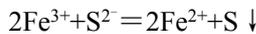
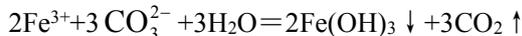
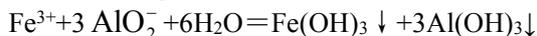
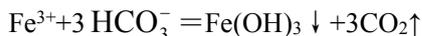
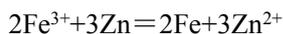
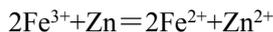
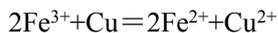
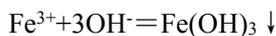
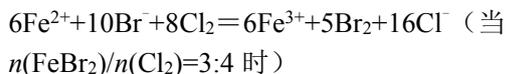
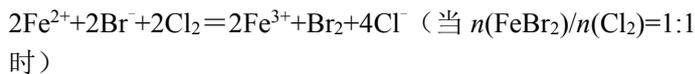
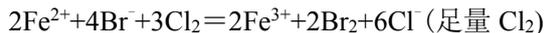
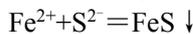
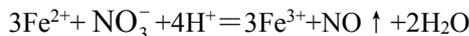
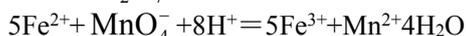
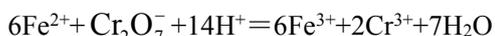
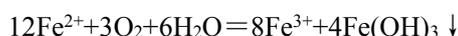
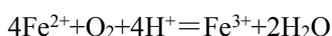
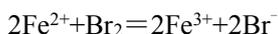
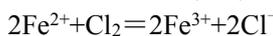
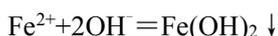
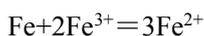
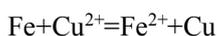
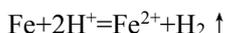
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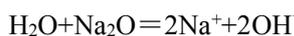
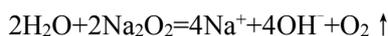
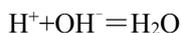
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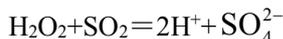
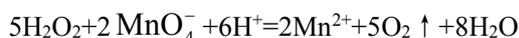
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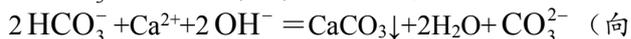
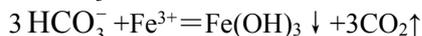
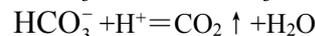
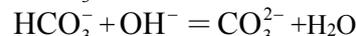
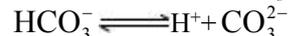
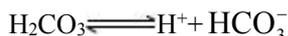
H₂O



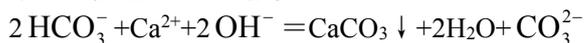
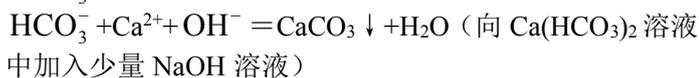
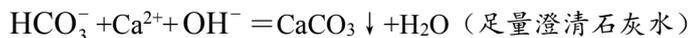
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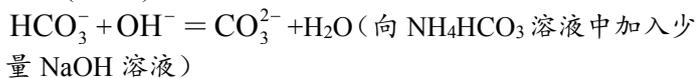
H₂CO₃ 系列



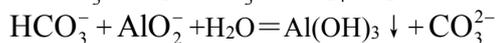
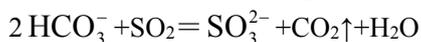
NaHCO₃ 溶液中加入少量澄清石灰水)



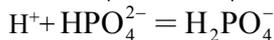
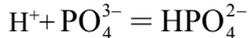
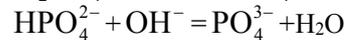
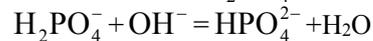
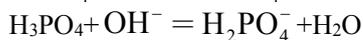
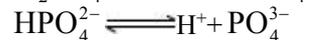
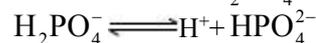
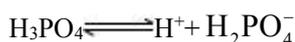
(Ca(HCO₃)₂ 溶液中加入足量 NaOH 溶液)



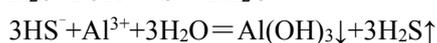
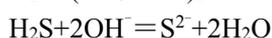
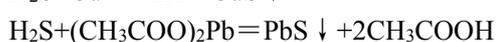
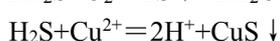
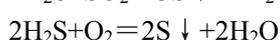
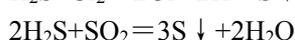
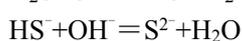
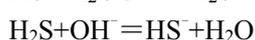
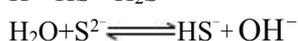
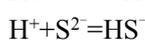
NH₄HCO₃ 溶液中加入足量 NaOH 溶液)



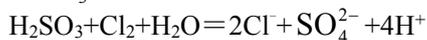
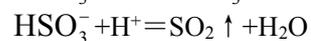
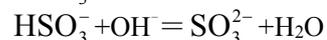
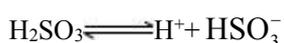
H₃PO₄ 系列



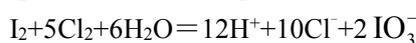
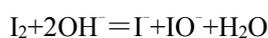
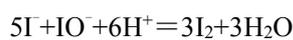
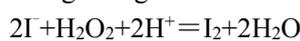
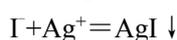
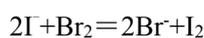
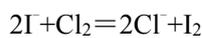
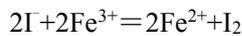
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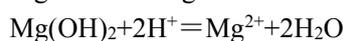
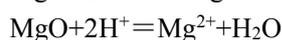
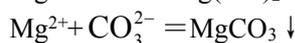
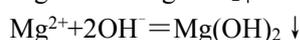
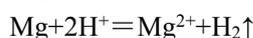
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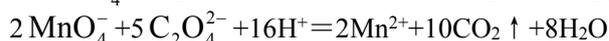
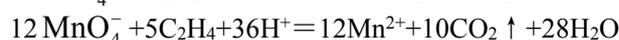
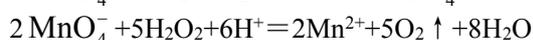
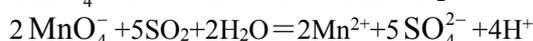
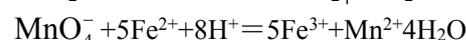
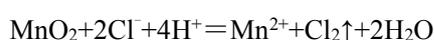
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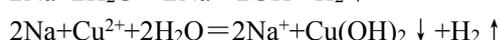
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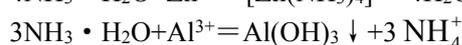
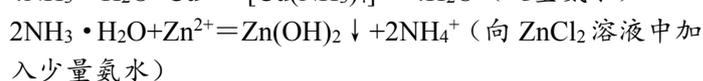
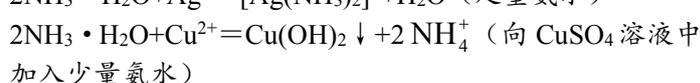
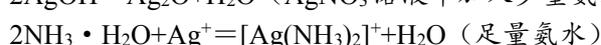
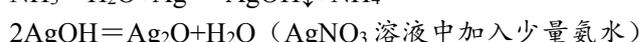
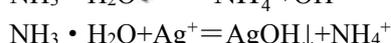
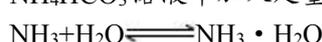
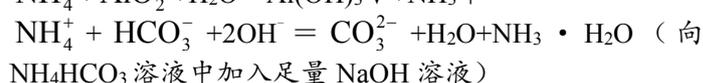
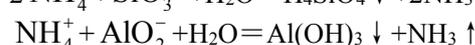
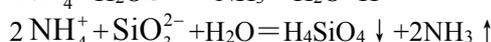
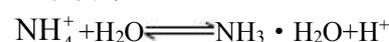
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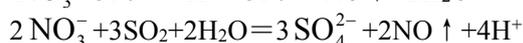
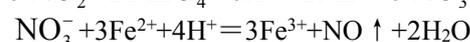
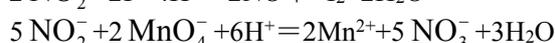
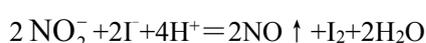
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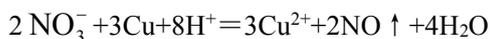


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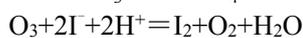
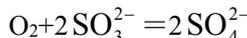
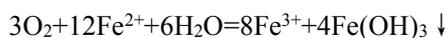
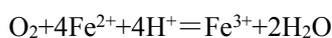
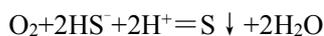
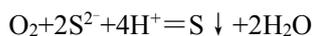
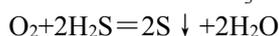
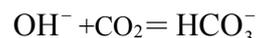


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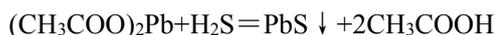
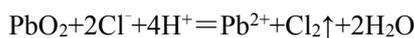
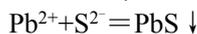
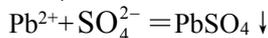
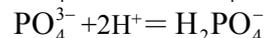
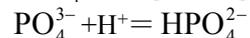
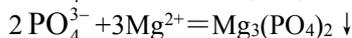
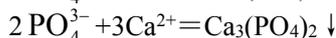
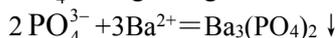
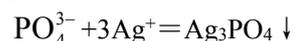




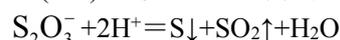
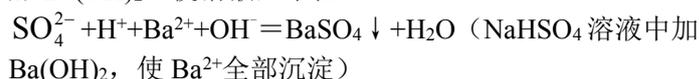
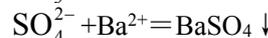
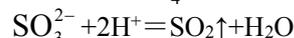
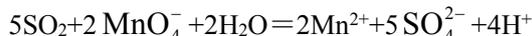
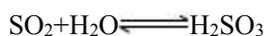
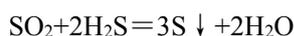
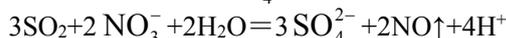
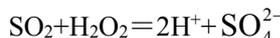
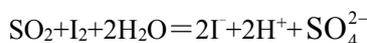
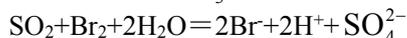
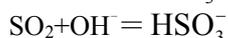
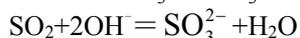
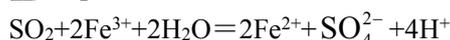
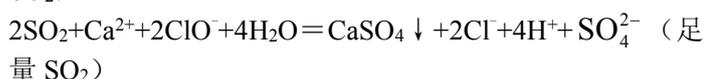
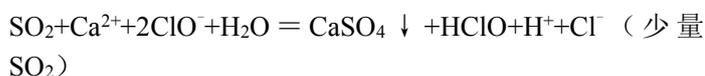
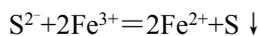
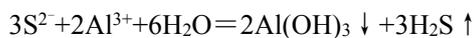
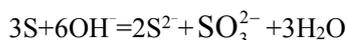
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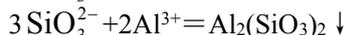
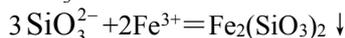
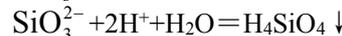
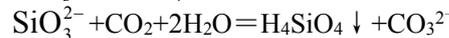
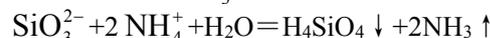
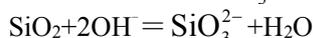
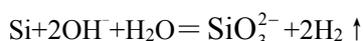
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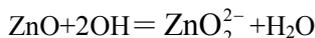
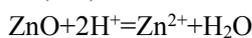
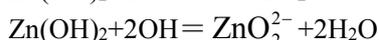
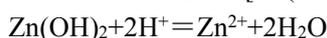
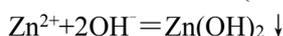
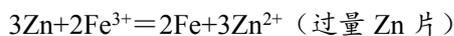
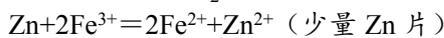
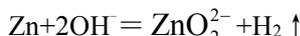
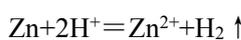
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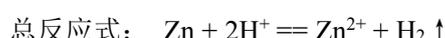
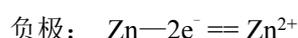
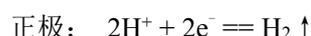
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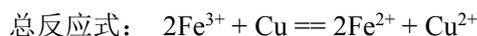
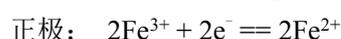
第六部分 电极反应方程式

一、原电池电极反应方程式

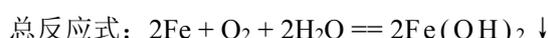
1. Cu—H₂SO₄—Zn 原电池



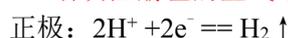
2. Cu—FeCl₃—C 原电池

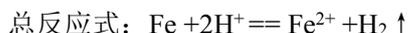


3. 钢铁在潮湿的空气中发生吸氧腐蚀

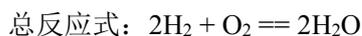
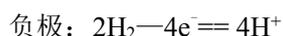


4. 钢铁在潮湿的空气中发生析氢腐蚀

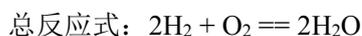




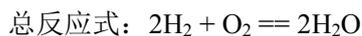
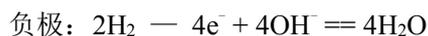
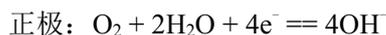
5. 氢氧燃料电池 (中性介质)



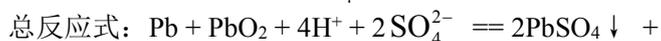
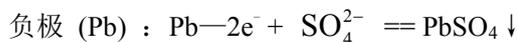
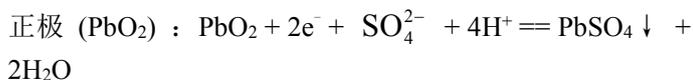
6. 氢氧燃料电池 (酸性介质)



7. 氢氧燃料电池 (碱性介质)

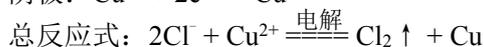
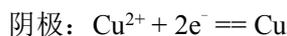


8. 铅蓄电池 (放电)

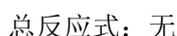


二、电解电极反应方程式

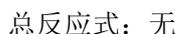
1. 电解 CuCl_2 溶液



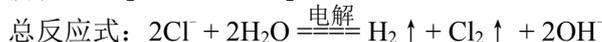
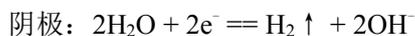
2. 电解精炼铜



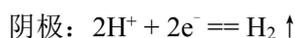
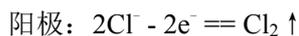
3. 电镀铜



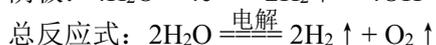
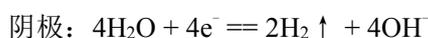
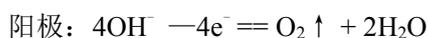
4. 电解饱和食盐水



5. 电解 HCl 溶液



6. 电解 NaOH 溶液

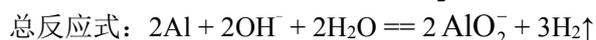
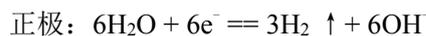


第七部分 热反应方程式

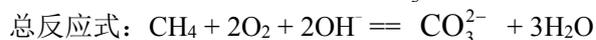
C



9. $\text{Al}-\text{NaOH}-\text{Mg}$ 原电池

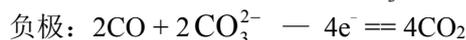


10. CH_4 燃料电池 (碱性介质)



11. 熔融碳酸盐燃料电池

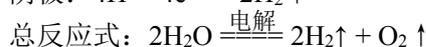
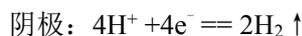
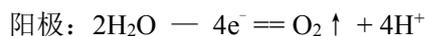
(Li_2CO_3 和 Na_2CO_3 熔融盐作电解液, CO 作燃料):



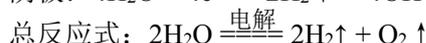
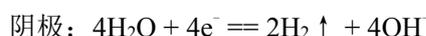
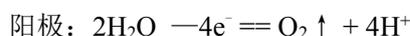
12. 银锌纽扣电池 (碱性介质)



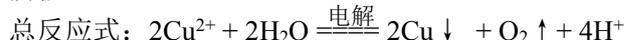
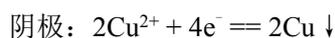
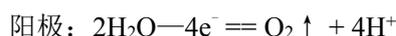
7. 电解 H_2SO_4 溶液



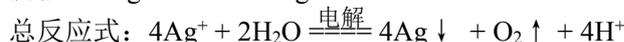
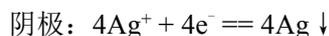
8. 电解 KNO_3 溶液



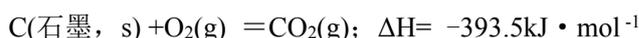
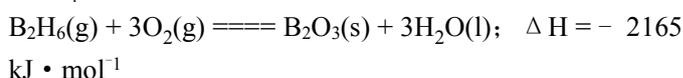
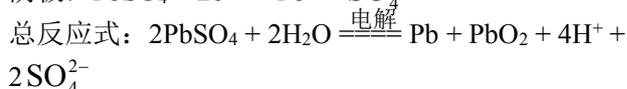
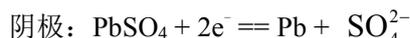
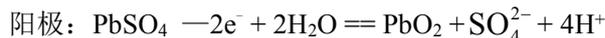
9. 电解 CuSO_4 溶液

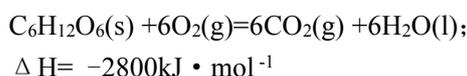
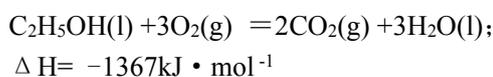
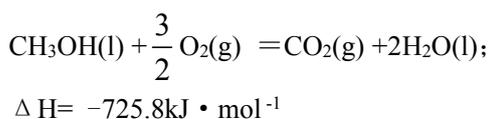
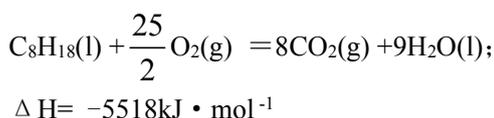
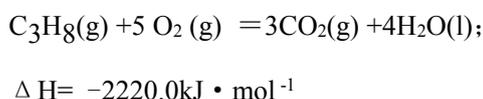
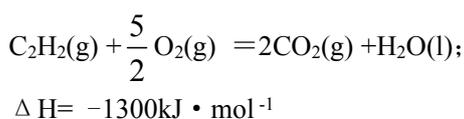
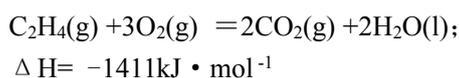
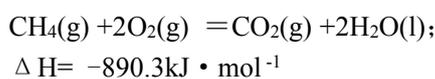
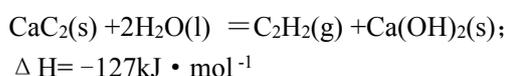
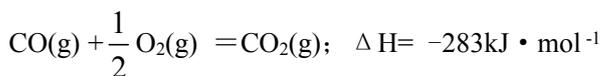
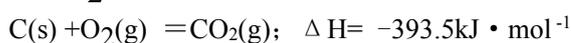
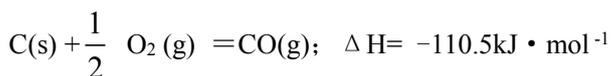
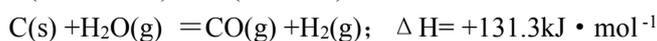
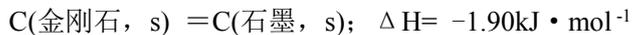
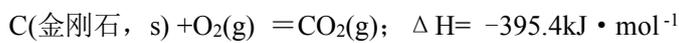


10. 电解 AgNO_3 溶液

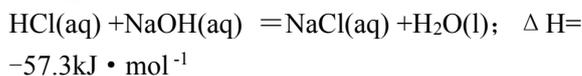
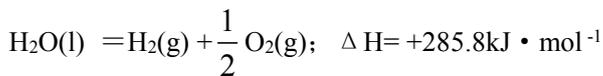
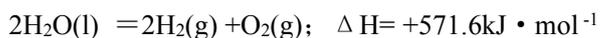
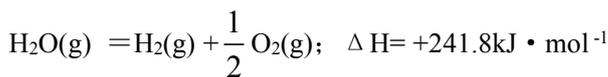
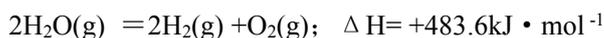
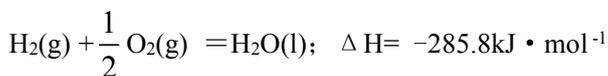
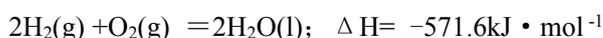
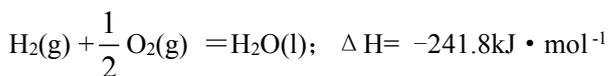
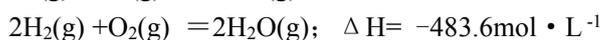
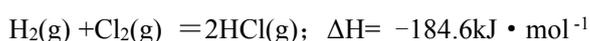


11. 铅蓄电池充电

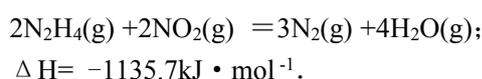
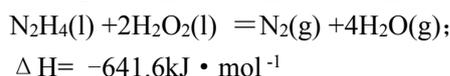
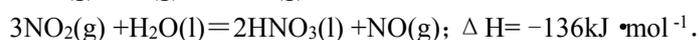
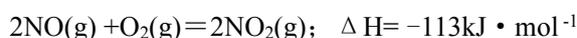
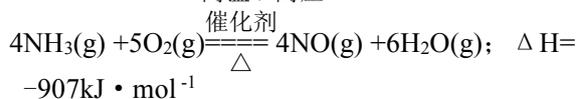




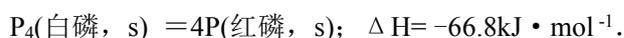
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