Chemistry 210 • Chemical Reactions \& Equations 2
Write COMPLETE, BALANCED chemical equations for the following reactions:

1. $\mathrm{Ca}+2 \mathrm{HCl} \rightarrow \mathrm{CaCl}_{2}+\mathrm{H}_{2}$
2.     - $\mathrm{FeS}+2$ aBr $\rightarrow \mathrm{FeBr}_{2}+\mathrm{Na}_{2} \mathrm{~S}$ (both oqueore - NR )
3. $2 \mathrm{~K}+2 \xrightarrow{(\mathrm{HOH})} 2 \mathrm{KOH}+\mathrm{H}_{2}$
4. $2 \mathrm{AlBr}_{(3)}$-(electrolysis $) \rightarrow 2 \mathrm{Al}_{(s)}+3 \mathrm{Br}_{2(\mathrm{u})}$
5. $3 \mathrm{BaCl}_{2}+\underline{2}{\mathrm{Na} 3 \mathrm{PO}_{4} \rightarrow} \quad \mathrm{Ba}_{3}\left(\mathrm{PO}_{4}\right)_{2}+6 \mathrm{NaCl}$
6. Calcium metal reacts with oxygen in the air.
7. Solutions of iron (II) nitrate and aluminum chloride are mixed.

8. Aqueous aluminum iodide is mixed with a solution of silver nitrate. (cog)

$$
\mathrm{AlI}_{3}+3 \mathrm{AgNO}_{3} \longrightarrow \mathrm{Al}\left(\mathrm{NO}_{3}\right)_{3}+3 \mathrm{Ag} I_{(s)}
$$

9. A solution of lead (II) nitrate is mixed with a solution of potassium hydroxide.


$$
3 \mathrm{Cl}_{2 \text { g })}+2 \mathrm{CrBr}_{3} \rightarrow 2 \mathrm{CrCl}_{3 \text { (q) }}+3 \mathrm{Br}_{2(\text { g })}
$$

11. Copper wire is added to a solution of Magnesium chloride.
Cu Caved
12. A strip of magnesium is added to a solution of (11)
13. Water is subjected to electrolysis.

$$
2 \mathrm{H}_{2} \mathrm{O}_{(\mathrm{e})} \stackrel{\text { eledrdysis }}{2} \underset{H_{2(g)}}{ }+\mathrm{O}_{2(\mathrm{~g})}
$$

14. Acetone $\left(\mathrm{C}_{3} \mathrm{H}_{6} \mathrm{O}\right)$ burns (assume complete combustion).
15. A piece of tin metal is thrown into a solution of silver nitrate.

$$
\begin{equation*}
S_{n(1)}+2 A_{g} N_{3} O_{(F)} \longrightarrow S_{n}(N o)_{0}+2 A A_{(1)} \tag{s}
\end{equation*}
$$

Balance the following chernical reactions and classify the reactions by type:

1. $4 \mathrm{Na}+1 \mathrm{O}_{2} \rightarrow 2 \mathrm{Na}_{2} \mathrm{O}$
2. $2 \mathrm{Al}+3 \mathrm{CuSO}_{4} \rightarrow 1 \mathrm{Al}_{2}\left(\mathrm{SO}_{4}\right)_{3}+3 \mathrm{Cu}$
3. $1 \mathrm{C}_{3} \mathrm{H}_{8}+S \mathrm{O}_{2} \rightarrow 3 \mathrm{CO}_{2}+4 \mathrm{H}_{2} \mathrm{O}$
4. $\alpha \mathrm{NCl}_{3} \rightarrow 1 \mathrm{~N}_{2}+3 \mathrm{Cl}_{2}$
5. $/ 6 \mathrm{Ag}+1 \mathrm{~s}_{8} \rightarrow \underline{8} \mathrm{Ag}_{2} \mathrm{~S}$

REACTION TYPE
synthesis
Single Replacement
Combustion
Decomposition
Synthesis

Write a BALANCED equation for each sentence. INCLUDE STATE SYMBOLS and amy catalysts or heat symbols.
6. Solid calcium carbonate reacts with hydrochloric acid $(\mathrm{HCl})$ to form solid calcium chloride, carbon dioxide, and water.

$$
\mathrm{CaCO}_{(\mathrm{s})}+2 \mathrm{HCl}_{(\text {op })} \longrightarrow \mathrm{CaCl}_{2(\mathrm{~s})}+\mathrm{CO}_{(\mathrm{g})}+\mathrm{H}_{2} \mathrm{O}_{(\mathrm{l})}
$$

7. Solid mercury(II) oxide is heated and it decomposes to mercury metal and oxygen.

$$
2 \mathrm{HgO} \longrightarrow 2 \mathrm{Hg}(x)+\mathrm{O}_{2(g)}
$$

8. An aqueous solution of chromium(VI) nitrate is mixed with a solution of sodium sulfide and a precipitate of chromium(VI) sulfide is formed whiesedum nitrate remains in solution.

$$
\mathrm{Cr}\left(\mathrm{NO}_{3}\right)_{6(\text { qq })}+3 \mathrm{Na}_{2} \mathrm{~S}_{(\text {(q) }} \longrightarrow
$$

Predict the products for the following double replacement reactions and BALANCE the equations. UsE the solubility chart to predict the STATE SYMBOLS for the products:
9. $\perp \mathrm{Fe}_{2}\left(\mathrm{SO}_{4}\right)_{(x)}+2\left(\mathrm{NH}_{4}\right) \mathrm{PO}_{4(8)} \rightarrow 2 \mathrm{FePO}_{4}(\mathrm{~s})+3\left(\mathrm{NH}_{4}\right)_{2} \mathrm{SO}_{4}\left(\mathrm{~g} \mathrm{~g}_{3}\right)$
10. $1 \mathrm{Ba}\left(\mathrm{NO}_{32}\right)_{(\alpha)}+1 \mathrm{Na}_{2} \mathrm{SO}_{4(a)} \rightarrow \quad 1 \mathrm{BaSO}_{4}+2 \mathrm{NaNO}_{(\mathrm{s})}+2{ }_{(\text {qq })}$

$$
\begin{aligned}
& \text { Predict the products for the following reactions and BALANCE the equations. }
\end{aligned}
$$

$$
\begin{aligned}
& S R \mathrm{BL} 2 \mathrm{KI}+\ldots \mathrm{Cl}_{2} \rightarrow 2 \mathrm{~K} \mathrm{Cl}+I_{2} \\
& \left.\underset{(\text { (ache. brace) }}{\operatorname{DR}}{ }^{13}-2 \mathrm{Al(OH}\right)_{3}+3 \mathrm{H}_{2} \mathrm{SO}_{4} \rightarrow 6 \mathrm{HOH}_{\mathrm{a}}+\quad \mathrm{Al}_{2}\left(\mathrm{SO}_{4}\right)_{3} \\
& \text { Conbustiont } 2 . \mathrm{C}_{1} \mathrm{H}_{10}+\mathrm{B3O}_{2} \rightarrow 8 \mathrm{CO}_{2}+10 \mathrm{H}_{2} \mathrm{O} \\
& \text { SR } 15.1 \mathrm{Mg}+2 \text { oNO }_{3} \rightarrow \mathrm{Mg}\left(\mathrm{NO}_{3}\right)_{2}+\mathrm{H}_{2}(\mathrm{~g}) \\
& \text { SR 16. } 3 \mathrm{Zn}+2 \mathrm{VCl}_{3} \rightarrow 3 \mathrm{ZnCl} \mathrm{Za}_{2}+2 \mathrm{~V} \\
& \text { Decay. 17. } 2 \mathrm{KBr} \xrightarrow{\text { datarstich }} 2 \mathrm{~K}+\mathrm{Br}_{2}
\end{aligned}
$$

Write formulas for the reactants, predict the products for the following reactions, write state symbols for all, and BALANCE the equations.

Syn 18. Potassium metal reacts with hydrogen gas.

$$
2 \mathrm{~K}_{(\mathrm{s})} \mathrm{H}_{2(\mathrm{~g})} \longrightarrow 2 \mathrm{KH}_{(\mathrm{s})}
$$

Note: When Hi recto w/ a metal, it male hydride,

Both Products ogueame $\rightarrow N R$ (no reaction) Combustion ${ }^{20 . \text { Liq }}$

$$
\mathrm{C}_{8} \mathrm{H}_{6}+12 \mathrm{O}_{2} \rightarrow 8 \mathrm{CO}_{2}+8 \mathrm{H}_{2} \mathrm{O}
$$

SR
21. Aqueous lithium bromide reacts with chlorine gas.

$$
2 L_{i} B_{(\text {op) }}+C l_{2(g)} \longrightarrow 2 L_{i} C l_{(q)}+B r_{2(x)}
$$

22. Sodium phosphate reacts with cobalt (II) chloride to form a precipitate.

DR

$$
\left.2 \mathrm{Na}_{3} \mathrm{PO}_{4}(\text { ag }), ~ 3 \mathrm{CoCl}_{2(\text { gog })}\right) \rightarrow \mathrm{CO}_{3}\left(\mathrm{PO}_{4}\right)_{(\mathrm{s})}+6 \mathrm{Na}_{\text {(ag) }}
$$

