

### Worksheet: Writing and Balancing Chemical Reactions

1. Balance the following equations and indicate the type of reaction as formation, decomposition, single replacement, double replacement, hydrocarbon combustion, or other.

- a.  $\text{Cu}_{(s)} + \text{O}_{2(g)} \rightarrow \text{CuO}_{(s)}$
- b.  $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2(g) + \text{O}_2(g)$
- c.  $\text{Fe}_{(s)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{H}_2(g) + \text{Fe}_3\text{O}_4(s)$
- d.  $\text{AsCl}_3(aq) + \text{H}_2\text{S}(aq) \rightarrow \text{As}_2\text{S}_3(s) + \text{HCl}(aq)$
- e.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}_{(s)} \rightarrow \text{CuSO}_4(s) + \text{H}_2\text{O}(g)$
- f.  $\text{Fe}_2\text{O}_3(s) + \text{H}_2(g) \rightarrow \text{Fe}(s) + \text{H}_2\text{O}(l)$
- g.  $\text{CaCO}_3(s) \rightarrow \text{CaO}(s) + \text{CO}_2(g)$
- h.  $\text{Fe}_{(s)} + \text{S}_8(s) \rightarrow \text{FeS}(s)$
- i.  $\text{H}_2\text{S}(aq) + \text{KOH}(aq) \rightarrow \text{H}_2\text{O}(l) + \text{K}_2\text{S}(aq)$
- j.  $\text{NaCl}(l) \rightarrow \text{Na}(l) + \text{Cl}_2(g)$
- k.  $\text{Al}_{(s)} + \text{H}_2\text{SO}_4(aq) \rightarrow \text{H}_2(g) + \text{Al}_2(\text{SO}_4)_3(aq)$
- l.  $\text{H}_3\text{PO}_4(aq) + \text{NH}_4\text{OH}(aq) \rightarrow \text{H}_2\text{O}(l) + (\text{NH}_4)_3\text{PO}_4(aq)$
- m.  $\text{C}_3\text{H}_8(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l)$
- n.  $\text{Al}_{(s)} + \text{O}_2(g) \rightarrow \text{Al}_2\text{O}_3(s)$
- o.  $\text{CH}_4(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l)$
- p.  $\text{K}_2\text{SO}_4(aq) + \text{BaCl}_2(aq) \rightarrow \text{KCl}(aq) + \text{BaSO}_4(s)$
- q.  $\text{C}_5\text{H}_{12}(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g)$
- r.  $\text{Ca}(\text{OH})_2(aq) + \text{NH}_4\text{Cl}(aq) \rightarrow \text{NH}_4\text{OH}(aq) + \text{CaCl}_2(aq)$
- s.  $\text{V}_2\text{O}_5(s) + \text{Ca}(s) \rightarrow \text{CaO}(s) + \text{V}(s)$
- t.  $\text{Na}(s) + \text{ZnI}_2(aq) \rightarrow \text{NaI}(aq) + \text{Zn}(s)$
- u.  $\text{C}_7\text{H}_6\text{O}_3(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l)$
- v.  $\text{Ca}(s) + \text{N}_2(g) \rightarrow \text{Ca}_3\text{N}_2(s)$
- w.  $\text{Fe}_2\text{O}_3(s) + \text{H}_2(g) \rightarrow \text{Fe}(s) + \text{H}_2\text{O}(l)$
- x.  $\text{C}_{15}\text{H}_{30}(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g)$
- y.  $\text{BN}(s) + \text{F}_2(g) \rightarrow \text{BF}_3(s) + \text{N}_2(g)$
- z.  $\text{C}_{12}\text{H}_{26}(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g)$

2. Predict the product(s) along with the states, indicate the type of reaction, and balance the following chemical reactions.

- a. A solution of lead (II) nitrate is mixed with a solution of sodium iodide.
- b. Solid zinc sulfide reacts with oxygen in the air.
- c. Liquid butane ( $\text{C}_4\text{H}_{10}(l)$ ) is used as a fuel to ignite a lighter.
- d. Barium hydroxide solution is neutralized by adding hydrochloric acid ( $\text{HCl}(aq)$ ).
- e. Copper metal is placed in a solution of silver nitrate.
- f. Sulfur burns in oxygen to make sulfur dioxide gas.
- g. A solution of aluminum sulfate is mixed with a solution of calcium hydroxide.
- h. Zinc metal is placed in sulfuric acid ( $\text{H}_2\text{SO}_4(aq)$ ).
- i. Aluminum powder is placed in a container filled with chlorine gas.
- j. Sucrose undergoes cellular respiration.