

Word Equations

Write the word equations below as chemical equations and balance:

- 1) Zinc and lead (II) nitrate react to form zinc nitrate and lead.

- 2) Aluminum bromide and chlorine gas react to form aluminum chloride and bromine gas.

- 3) Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride.

- 4) Potassium metal and chlorine gas combine to form potassium chloride.

- 5) Aluminum and hydrochloric acid react to form aluminum chloride and hydrogen gas.

- 6) Calcium hydroxide and phosphoric acid react to form calcium phosphate and water.

- 7) Copper and sulfuric acid react to form copper (II) sulfate and water and sulfur dioxide.

- 8) Hydrogen gas and nitrogen monoxide react to form water and nitrogen gas.

Section 2: Practicing equation balancing

Before you can write a balanced equation for a problem which asks you to predict the products of a reaction, you need to know how to balance an equation. Because some of you may not fully remember how to balance an equation, here are some practice problems:

- 1) $__ \text{C}_6\text{H}_6 + __ \text{O}_2 \rightarrow __ \text{H}_2\text{O} + __ \text{CO}_2$
- 2) $__ \text{NaI} + __ \text{Pb}(\text{SO}_4)_2 \rightarrow __ \text{PbI}_4 + __ \text{Na}_2\text{SO}_4$
- 3) $__ \text{NH}_3 + __ \text{O}_2 \rightarrow __ \text{NO} + __ \text{H}_2\text{O}$
- 4) $__ \text{Fe}(\text{OH})_3 \rightarrow __ \text{Fe}_2\text{O}_3 + __ \text{H}_2\text{O}$
- 5) $__ \text{HNO}_3 + __ \text{Mg}(\text{OH})_2 \rightarrow __ \text{H}_2\text{O} + __ \text{Mg}(\text{NO}_3)_2$
- 6) $__ \text{H}_3\text{PO}_4 + __ \text{NaBr} \rightarrow __ \text{HBr} + __ \text{Na}_3\text{PO}_4$
- 7) $__ \text{C} + __ \text{H}_2 \rightarrow __ \text{C}_3\text{H}_8$
- 8) $__ \text{CaO} + __ \text{MnI}_4 \rightarrow __ \text{MnO}_2 + __ \text{CaI}_2$
- 9) $__ \text{Fe}_2\text{O}_3 + __ \text{H}_2\text{O} \rightarrow __ \text{Fe}(\text{OH})_3$
- 10) $__ \text{C}_2\text{H}_2 + __ \text{H}_2 \rightarrow __ \text{C}_2\text{H}_6$

- 11) $__ \text{VF}_5 + __ \text{HI} \rightarrow __ \text{V}_2\text{I}_{10} + __ \text{HF}$
- 12) $__ \text{OsO}_4 + __ \text{PtCl}_4 \rightarrow __ \text{PtO}_2 + __ \text{OsCl}_8$
- 13) $__ \text{CF}_4 + __ \text{Br}_2 \rightarrow __ \text{CBr}_4 + __ \text{F}_2$
- 14) $__ \text{Hg}_2\text{I}_2 + __ \text{O}_2 \rightarrow __ \text{Hg}_2\text{O} + __ \text{I}_2$
- 15) $__ \text{Y}(\text{NO}_3)_2 + __ \text{GaPO}_4 \rightarrow __ \text{YPO}_4 + __ \text{Ga}(\text{NO}_3)_2$

Writing Complete Equations Practice

For each of the following problems, write complete chemical equations to describe the chemical process taking place. Important note: There are a few physical processes on this sheet – remember, you can't write an equation for a physical process!

- When lithium hydroxide pellets are added to a solution of sulfuric acid, lithium sulfate and water are formed.
- When dirty water is boiled for purification purposes, the temperature is brought up to 100° C for 15 minutes.
- If a copper coil is placed into a solution of silver nitrate, silver crystals form on the surface of the copper. Additionally, highly soluble copper (I) nitrate is generated.
- When crystalline C₆H₁₂O₆ is burned in oxygen, carbon dioxide and water vapor are formed.
- When a chunk of palladium metal is ground into a very fine powder and heated to drive off any atmospheric moisture, the resulting powder is an excellent catalyst for chemical reactions.

Word Equations – Answer Key

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| 1) $\text{Zn} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{Pb}$ | 1) $\underline{2} \text{C}_6\text{H}_6 + \underline{15} \text{O}_2 \rightarrow \underline{6} \text{H}_2\text{O} + \underline{12} \text{CO}_2$ |
| 2) $\underline{2} \text{AlBr}_3 + \underline{3} \text{Cl}_2 \rightarrow \underline{2} \text{AlCl}_3 + \underline{3} \text{Br}_2$ | 2) $\underline{4} \text{NaI} + \underline{1} \text{Pb}(\text{SO}_4)_2 \rightarrow \underline{1} \text{PbI}_4 + \underline{2} \text{Na}_2\text{SO}_4$ |
| 3) $\underline{2} \text{Na}_3\text{PO}_4 + \underline{3} \text{CaCl}_2 \rightarrow \underline{6} \text{NaCl} + \underline{\text{Ca}_3(\text{PO}_4)_2}$ | 3) $\underline{2} \text{NH}_3 + \underline{2} \text{O}_2 \rightarrow \underline{1} \text{NO} + \underline{3} \text{H}_2\text{O}$ |
| 4) $\underline{2} \text{K} + \text{Cl}_2 \rightarrow \underline{2} \text{KCl}$ | 4) $\underline{2} \text{Fe}(\text{OH})_3 \rightarrow \underline{1} \text{Fe}_2\text{O}_3 + \underline{3} \text{H}_2\text{O}$ |
| 5) $\underline{2} \text{Al} + \underline{6} \text{HCl} \rightarrow \underline{3} \text{H}_2 + \underline{2} \text{AlCl}_3$ | 5) $\underline{2} \text{HNO}_3 + \underline{1} \text{Mg}(\text{OH})_2 \rightarrow \underline{2} \text{H}_2\text{O} + \underline{1} \text{Mg}(\text{NO}_3)_2$ |
| 6) $\underline{3} \text{Ca}(\text{OH})_2 + \underline{2} \text{H}_3\text{PO}_4 \rightarrow \underline{\text{Ca}_3(\text{PO}_4)_2} + \underline{6} \text{H}_2\text{O}$ | 6) $\underline{1} \text{H}_3\text{PO}_4 + \underline{3} \text{NaBr} \rightarrow \underline{3} \text{HBr} + \underline{1} \text{Na}_3\text{PO}_4$ |
| 7) $\text{Cu} + \underline{2} \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \underline{2} \text{H}_2\text{O} + \text{SO}_2$ | 7) $\underline{3} \text{C} + \underline{4} \text{H}_2 \rightarrow \underline{1} \text{C}_3\text{H}_8$ |
| 8) $\underline{2} \text{H}_2 + \underline{2} \text{NO} \rightarrow \underline{2} \text{H}_2\text{O} + \text{N}_2$ | 8) $\underline{2} \text{CaO} + \underline{1} \text{MnI}_4 \rightarrow \underline{1} \text{MnO}_2 + \underline{2} \text{CaI}_2$ |
| | 9) $\underline{1} \text{Fe}_2\text{O}_3 + \underline{3} \text{H}_2\text{O} \rightarrow \underline{2} \text{Fe}(\text{OH})_3$ |
| | 10) $\underline{1} \text{C}_2\text{H}_2 + \underline{2} \text{H}_2 \rightarrow \underline{1} \text{C}_2\text{H}_6$ |

Section 2: Practicing equation balancing

Writing Complete Equations Practice - Key

- $\underline{2} \text{LiOH}_{(s)} + \text{H}_2\text{SO}_{4(aq)} \rightarrow \text{Li}_2\text{SO}_{4(aq)} + \underline{2} \text{H}_2\text{O}_{(l)}$
- No equation is needed, as boiling is a physical process.
- $\text{Cu}_{(s)} + \text{AgNO}_{3(aq)} \rightarrow \text{Ag}_{(s)} + \text{CuNO}_{3(aq)}$
- $\text{C}_6\text{H}_{12}\text{O}_{6(s)} + \underline{6} \text{O}_{2(g)} \rightarrow \underline{6} \text{CO}_{2(g)} + \underline{6} \text{H}_2\text{O}_{(g)}$
- Both grinding and heating are physical processes. Even if the atmospheric moisture is mentioned, boiling is still a physical process. No equation is needed.