Lab 9 - Exercise Answers

Results: Translate and balance each word description chemical reaction.

Type your answer in the space below the problem (as shown in problem1)

Pay attention to font case (ie. Chlorine is Cl not CL, Carbon dioxide is CO_2, not Co_2)
( ) are not used when subscript is one (ie. Na_2SO_4 has no parenthesis)
Leave a blank space between coefficient and formula
Leave a blank space on either side of the + sign
Coefficient of 1 is understood and not listed
If possible, divide all coefficients by a common divisor
Pay attention to diatomics

Combination Reactions—Instructor Demonstrations

1. *magnesium$_{(s)}$ + oxygen$_{(g)}$ $\xrightarrow{\Delta}$ magnesium oxide$_{(s)}$

$2\ Mg + O_2 \rightarrow 2\ MgO$

2. *ammonia$_{(g)}$ + hydrogen chloride$_{(g)}$ → ammonium chloride$_{(s)}$

$NH_3 + HCl \rightarrow NH_4Cl$

Decomposition Reactions

3. *hydrogen peroxide → wáter plus oxygen

$2\ H_2O_2 \rightarrow 2\ H_2O + O_2$

Complete Combustion of Organic Fuel Reactions

4. *methane$_{(g)}$ + oxygen$_{(g)}$ $\xrightarrow{\Delta}$ carbon dioxide$_{(g)}$ + water$_{(g)}$

$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$

5. *ethanol$_{(l)}$ + oxygen$_{(g)}$ $\xrightarrow{\Delta}$ water$_{(g)}$ + carbon dioxide$_{(g)}$

$C_2H_5OH + 3\ O_2 \rightarrow 3\ H_2O + 2\ CO_2$

Single-Replacement Reactions

6. *zinc$_{(s)}$ + copper(II) sulfate $_{(aq)}$ → zinc sulfate$_{(aq)}$ + copper $_{(s)}$

$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

7. *magnesium$_{(s)}$ + hydrochloric acid$_{(aq)}$ → magnesium chloride$_{(aq)}$ + hydrogen$_{(g)}$

$Mg + 2\ HCl \rightarrow MgCl_2 + H_2$

Double-Replacement Reactions: Precipitation Reaction

8. *copper(II) sulfate$_{(aq)}$ + sodium hydroxide$_{(aq)}$ → copper(II) hydroxide$_{(s)}$ + sodium sulfate$_{(aq)}$

$CuSO_4 + 2\ NaOH \rightarrow Cu(OH)_2 + Na_2SO_4$

9. *calcium chloride$_{(aq)}$ + sodium sulfate$_{(aq)}$ → calcium sulfate$_{(s)}$ + sodium chloride$_{(aq)}$

$CaCl_2 + Na_2SO_4 \rightarrow CaSO_4 + 2\ NaCl$

10. *potassium carbonate$_{(aq)}$ + calcium chloride$_{(aq)}$→ calcium carbonate$_{(s)}$ + potassium chloride$_{(aq)}$

$K_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2\ KCl$

Double-Replacement Reactions: Gas Forming Reactions

11. *potassium carbonate$_{(aq)}$ + hydrochloric acid$_{(aq)}$ → potassium chloride$_{(aq)}$ + water$_{(l)}$ + carbon dioxide$_{(g)}$

$K_2CO_3 + 2\ HCl \rightarrow 2\ KCl + H_2O + CO_2$

12. *sulfuric acid$_{(aq)}$ + sodium carbonate$_{(aq)}$ → sodium sulfate$_{(aq)}$ + water$_{(l)}$ + carbon dioxide$_{(g)}$

$H_2SO_4 + Na_2CO_3 \rightarrow Na_2SO_4 + H_20 + CO_2$

Double-Replacement Reactions: Neutralization Reactions

13. *nitric acid$_{(aq)}$ + sodium hydroxide$_{(aq)}$ → sodium nitrate$_{(aq)}$ + water$_{(l)}$

$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

14. *sulfuric acid$_{(aq)}$ + sodium hydroxide$_{(aq)}$ → sodium sulfate$_{(aq)}$ + water$_{(l)}$

$H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2\ H_2O$

Conclusion: List some indicators of chemical reactions:

Formation of:

Heat
Light
Flame
Precipitate
Gas Bubbles
Odor

Color Change
Chilling

The * indicates the exact reaction was listed in the lab briefing slides

Questions

Balance and Classify the following chemical reactions:

1) *2 $C_2H_{2\ (g)}$ + 5 $O_{2\ (g)}$ → 4 $CO_{2\ (g)}$ + 2 $H_2O_{\ (g)}$

Combustion

2) $H_3PO_{4\ (aq)}$ + 3 $LiOH_{\ (aq)}$ → $Li_3PO_{4\ (aq)}$ + 3 $H_2O_{\ (l)}$

Neutralización

3) $C_2H_{2\ (g)}$ + 2 $H_{2\ (g)}$ → $C_2H_{6\ (g)}$

Combination (Synthesis)

4) $(NH_4)_2S_{\ (aq)}$ + $ZnCl_{2\ (aq)}$ → $ZnS_{\ (s)}$ + 2 $NH_4Cl_{\ (aq)}$

Precipitation

5) 2 $Al_{\ (s)}$ + $Fe_2O_{3\ (s)}$ → 2 $Fe_{\ (s)}$ + $Al_2O_{3\ (s)}$

Single Displacement (Replacement)

6) $CaCO_{3\ (s)}$ $\Delta\rightarrow$ $CaO_{\ (s)}$ + $CO_{2\ (g)}$

Decomposition

7) $Na_2SO_{3\ (aq)}$ + 2 $HNO_{3\ (aq)}$ → 2 $NaNO_{3\ (aq)}$ + $H_2O_{\ (l)}$ + $SO_{2\ (g)}$

Gas Forming

8) $Cl_{2\ (g)}$ + 2 $KI_{\ (aq)}$ → $I_{2\ (aq)}$ + 2 $KCl_{\ (aq)}$

Single Displacement (Replacement)