| ASSESSMENT	**Chapter 7 Test**	BLM 7.3.1

Multiple-Choice Questions

Circle the letter for the choice that best completes the statement or answers the question.

1. Data from solubility tables indicates that all nitrates, NO_3^-(aq), are soluble. When $FeCl_3$(aq) is mixed with $AgNO_3$(aq), a precipitate forms. What are the spectator ions in this reaction?
    a) Fe^{3+}(aq) + Cl^-(aq)
    b) Ag^+(aq) + Cl^-(aq)
    c) Fe^{3+}(aq) + NO_3^-(aq)
    d) Ag^+(aq) + NO_3^-(aq)

2. A reagent that will precipitate Cu^{2+}(aq) but not K^+(aq) is
    a) NaOH(aq)
    b) $AgNO_3$(aq)
    c) NH_4Cl(aq)
    d) Li_2SO_4(aq)

3. The characteristic red flame colour from lithium ions, Li^+(aq), occurs when thermally excited electrons
    a) absorb red light from the visible spectrum
    b) emit energy as they return to a lower energy level
    c) are emitted from the ions
    d) form bonds between the ions

4. In the chemical reaction represented by the following equation, the mole ratio of carbon dioxide to butane is _____ .
$$2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$$
    a) 2:8
    b) 13:8
    c) 5:1
    d) 4:1

5. Which reagent correctly balances the formation reaction: $3Pb + $ _____ $\rightarrow Pb_3O_4$?
    a) Pb_2O_4
    b) O_4
    c) PbO_4
    d) $2O_2$

6. In the reaction $X + 3Y \rightarrow 2Z$, the mass of X is 5.0 g and the mass of Z is 14.0 g. If the reaction was carried out again and the mass of Z produced was 7.0 g, what mass of Y reacted?
    a) 2.5 g
    b) 4.5 g
    c) 7.0 g
   d) 9.0 g

		BLM 7.3.1
ASSESSMENT	**Chapter 7 Test**	

7. A solution of NaCl(aq) is added dropwise to a 10.0 mL sample of water from an industrial site that contains lead(II) nitrate, $Pb(NO_3)_2$(aq). A white precipitate forms immediately. What is the net ionic equation for the reaction that occurred?
    a) Na^+(aq) + Cl^-(aq) → NaCl(s)
    b) Pb^{2+}(aq) + $2NO_3^-$(aq) + $2Na^+$(aq) + $2Cl^-$(aq) → $PbCl_2$(s) + $2Na^+$(aq) + $2Cl^-$(aq)
    c) Pb^{2+}(aq) + $2NO_3^-$(aq) + $2Na^+$(aq) + $2Cl^-$(aq) → Pb^{2+}(aq) + $2Cl^-$(aq) + 2NaCl(s)
    d) Pb^{2+}(aq) + $2Cl^-$(aq) → $PbCl_2$(s)

8. In the reaction $2NF_3$(g) → N_2(g) + $3F_2$(g), if 4.0 mol of F_2(g) is produced, how many mol of NF_3 reacted?
    a) 2.7
    b) 2.0
    c) 8.0
    d) 6.0

9. What mass of water vapour is produced when 0.402 mol of hydrogen burn completely in an excess of oxygen?

$$2H_2(g) + O_2(g) → 2H_2O(g)$$

    a) 3.62 g
    b) 7.24 g
    c) 145 g
    d) 1.81 g

10. Iron nails can rust in the presence of moist air. The chemical reaction can be represented by the following **unbalanced** equation:

$$\_Fe(s) + \_O_2(g) → \_Fe_2O_3(s)$$
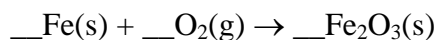
A true statement regarding this reaction is:
    a) If 2.6 mol of Fe(s) react, 1.3 mol of Fe_2O_3(s) forms.
    b) If 3 mol of O_2(g) react, 3 mol of Fe_2O_3(s) forms.
    c) If 4 mol of Fe(s) react, 8 mol of Fe_2O_3(s) forms.
    d) If 4 mol of O_2(g) react, 3 mol of Fe(s) react.

11. A student burned butane with a known quantity of oxygen. The reaction that occurred can be represented as follows.

$$2C_4H_{10}(l) + 13O_2(g) → 8CO_2(g) + 10H_2O(g)$$
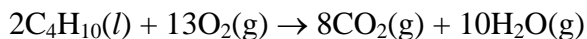
Initially, 7.0 mol of butane and 23.0 mol of oxygen were present. After the reaction was stopped, 4.0 mol of butane remained. The number of mol of oxygen that also remained is
    a) 2.0
    b) 3.5
   c) 11
    d) 20

Chapter 7 Test

12. Calcium hydroxide can be used as an antacid to treat upset stomachs. The calcium hydroxide reacts with stomach acid according to the following balanced equation.

$$Ca(OH)_2(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$$
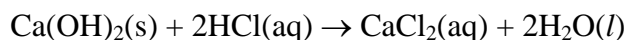
The mass of stomach acid that would react with 0.135 mol of calcium hydroxide is
   a) 2.46 g
   b) 4.92 g
   c) 9.84 g
   d) 10.2 g

13. In the reaction between zinc and dilute sulfuric acid, 0.200 mol of zinc react completely.

$$Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$$
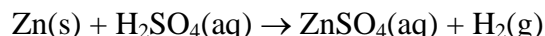
What volume of hydrogen gas, $H_2(g)$, will be produced at SATP?
   a) 4.48 L
   b) 0.558 L
   c) 4.96 L
   d) 9.92 L

14. When 150.0 mL of sodium hydroxide, NaOH(aq), reacts with aluminum sulfate, $Al_2(SO_4)_3$(aq), 0.0400 mol of aluminum hydroxide, $Al(OH)_3$(s), precipitate. What is the concentration of the NaOH?

$$6NaOH(aq) + Al_2(SO_4)_3(aq) \rightarrow 2Al(OH)_3(s) + 3Na_2SO_4(aq)$$
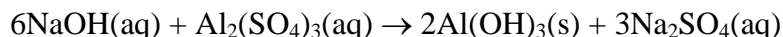
   a) 0.800 mol/L
   b) 1.20 mol/L
   c) 0.267 mol/L
   d) 1.80 mol/L

15. The complete combustion of butane, C_4H_{10}(g), yields carbon dioxide and water vapour. If the 1.6 mol of CO_2(g) is produced, what mass of water vapour also formed?

$$C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$$
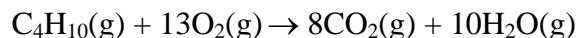
   a) 72 g
   b) 36 g
   c) 23 g
   d) 9.0 g

ASSESSMENT	**Chapter 7 Test**	**BLM 7.3.1**

Numerical Response Questions

For each numerical response question, record the answer in the following response box.

16.
17.
18.
19.
20.
21.

16. Copper metal and aqueous silver nitrate solution react in a single-replacement reaction. If 1.52 g of copper react completely, what mass of silver will be produced?

$$Cu(s) + AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + 2Ag(s)$$
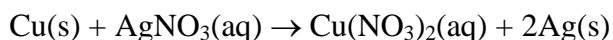
17. Hydrogen fluoride gas that is used in the manufacture of Freon™ can be produced by the following reaction.

$$CaF_2(aq) + H_2SO_4(aq) \rightarrow CaSO_4(s) + 2HF(g)$$
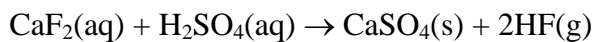
What volume of HF at STP will be produced when 780.8 g of calcium fluoride react?

18. What mass of silver chloride will precipitate when 30.0 mL of 0.50 mol/L calcium chloride, $CaCl_2(aq)$, react completely with silver nitrate solution?

$$CaCl_2(aq) + 2AgNO_3(aq) \rightarrow Ca(NO_3)_2(aq) + 2AgCl(s)$$
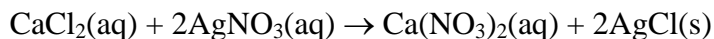
ASSESSMENT	**Chapter 7 Test**	BLM 7.3.1

19. A sample of methane burned to produce 4.63 L of carbon dioxide at 104.1 kPa and 17.0 ^{o}C. What mass of methane burned?

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$$
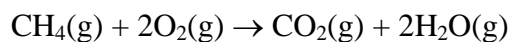
20. What volume 0.406 mol/L HCl(aq) will react completely with 17.12 g of magnesium carbonate?

$$MgCO_3(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l) + CO_2(g)$$

21. Nitrogen dioxide gas, $NO_2(g)$, reacts with fluorine gas, F_2, as shown by the equation:

$$2NO_2(g) + F_2(g) \rightarrow 2NO_2F(g)$$
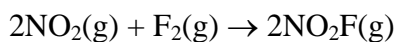
What volume of fluorine gas reacts completely with 0.78 L of nitrogen dioxide if both gases are measured at 30.0 ^{o}C and 1.05 atm?

Written Response Questions

Answer each question in the space provided. Use complete sentences and diagrams when necessary.

22.   a) Balance the equation for the reaction between silver sulfide, $Ag_2S(s)$, and hydrochloric acid, HCl(aq).

$$Ag_2S(s) + HCl(aq) \rightarrow AgCl(s) + H_2S(g)$$

_____

_____

_____
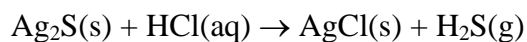
       b) What type of reaction is this?

_____

_____

c) What volume of 6.00 mol/L HCl(aq) will produce 40.0 g of AgCl?

_____

_____

_____

_____

_____

23. What mass of chromium(III) sulfide, $Cr_2S_3(s)$, will be produced when 30.0 g of chromium(III) oxide, $Cr_2O_3(s)$, reacts with an excess of hydrogen sulfide gas?

$$Cr_2O_3(s) + 3H_2S(g) \rightarrow Cr_2S_3(s) + 3H_2O(l)$$

_____

_____

_____

_____

_____

_____

_____