Key

Period:____

. Unit 8 Review: Reactions and Stoichiometry

t 1: Balance the following equations and identify the type of reaction.

1. 2 $NaBr$ + 1 $Ca(OH)_2$ → 1 $CaBr_2$ + 2 $NaOH$ Reaction Type : D.R.

2. 1 C_3H_8 + 5 O_2 → 3 CO_2 + 4 H_2O Reaction Type : Combustion

3. 3 Pb + 2 H_3PO_4 → 3 H_2 + 1 $Pb_3(PO_4)_2$ Reaction Type : S.R.

4. 2 $NaHCO_3$ → 1 Na_2CO_3 + 1 H_2O + 1 CO_2 Reaction Type: decomposition

5. 1 Li_3N + 3 NH_4NO_3 → 3 $LiNO_3$ + 1 $(NH_4)_3N$ Reaction Type : D.R.

6. 2 Mg + 1 O_2 → 2 MgO Reaction Type : Synthesis

7. 3 HBr + 1 $Al(OH)_3$ → 3 H_2O + 1 $AlBr_3$ Reaction Type : D.R.

8. 1 Na_3PO_4 + 3 KOH → 3 $NaOH$ + 1 K_3PO_4 Reaction Type: D.R.

9. 1 $(NH_4)_2CO_3$ → 2 NH_3 + 1 H_2O + 1 CO_2 Reaction Type: decomposition

10. 2 $AgNO_3$ + 1 Cu → 1 $Cu(NO_3)_2$ + 2 Ag Reaction Type: S.R.

Part 2: For each of the following reactions:

a. Complete the reaction (Put NR if no reaction takes place)
b. Balance the reaction
c. Identify the type of reaction

12) $NaCl_{(aq)} + AgNO_{3(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$ Type of Reaction: D.R.

13) $Fe_{(s)} + CuSO_{4(aq)} \rightarrow Cu(s) + FeSO_4(aq)$ Type of Reaction: S.R.

14) $C_5H_{12} + 8O_2 \rightarrow 5CO_2(g) + 6H_2O(g)$ Type of Reaction: combustion
(g) (g)

15) $Ba(NO_3)_2 + Na_2SO_4 \rightarrow 2NaNO_3(aq) + BaSO_4(s)$ Reaction: D.R.
(aq) (aq)

16) $Cl_2 + 2NaBr \rightarrow Br_2(l) + 2NaCl(aq)$ Type of Reaction: S.R.
(g) (aq)

17) $LiBr + Cu \rightarrow$ NR Type of Reaction: NR
(aq) (s)

18) $Li_2S(aq) + Ca(OH)_2(aq) \rightarrow CaS(s) + 2LiOH(aq)$ Reaction: D.R.

19) $2LiCl + Cu(NO_3)_2 \rightarrow CuCl_2(aq) + 2LiNO_3(aq)$ Reaction: NR
(aq) (aq)
NR *both are aqueous products.

20) $Zn + Fe(NO_3)_2 \rightarrow Fe(s) + Zn(NO_3)_2(aq)$ Type of Reaction: S.R.
(s) (aq)

Part 3: Write a balanced equation for the reactions described below.

21) aqueous solutions of lead (II) nitrate is added to sodium chloride

$$Pb(NO_3)_2(aq) + 2NaCl(aq) \rightarrow 2NaNO_3(aq) + PbCl_2(s)$$

22) zinc sulfate is added to lithium carbonate

$$ZnSO_4(aq) + Li_2CO_3(aq) \rightarrow Li_2SO_4(aq) + ZnCO_3(s)$$

...ry Review:

Consider the following reaction assuming it occurs at STP:

$N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$

a. What is the mole ratio of N_2 to NH_3?

$1\ mol\ N_2 : 2\ mol\ NH_3$

b. How many moles of NH_3 are formed when 4 mol N_2 completely react?

$$4\ mol\ N_2 \times \frac{2\ mol\ NH_3}{1\ mol\ N_2} = \boxed{8\ mol\ NH_3}$$

c. How many moles of N_2 are consumed when 10 mol NH_3 are produced?

$$10\ mol\ NH_3 \times \frac{1\ mol\ N_2}{2\ mol\ NH_3} = \boxed{5\ mol\ N_2}$$

d. What is the mole ratio of N_2 to H_2?

$1\ mol\ N_2 : 3\ mol\ H_2$

e. How many moles of H_2 are consumed when 3 mol N_2 completely react?

$$3\ mol\ N_2 \times \frac{3\ mol\ H_2}{1\ mol\ N_2} = 9\ mol\ H_2$$

f. How many moles of N_2 are consumed when 0.75 mol H_2 completely react?

$$0.75\ mol\ H_2 \times \frac{1\ mol\ N_2}{3\ mol\ H_2} = 0.25\ mol\ N_2$$

g. What is the mole ratio of H_2 to NH_3?

$3\ mol\ H_2 : 2\ mol\ NH_3$

h. How many grams of NH_3 are produced when 12 g H_2 completely react?

$$12\ g\ H_2 \times \frac{1\ mol\ H_2}{2.0\ g\ H_2} \times \frac{2\ mol\ NH_3}{3\ mol\ H_2} \times \frac{17.0\ g\ NH_3}{1\ mol\ NH_3} = \boxed{68\ g\ NH_3}$$

i. How many grams of H_2 are required to produce 8.5g NH_3?

$$8.5\ g\ NH_3 \times \frac{1\ mol\ NH_3}{17.0\ g\ NH_3} \times \frac{3\ mol\ H_2}{2\ mol\ NH_3} \times \frac{2.0\ g}{1\ mol\ H_2} = \boxed{1.5\ g}$$

2) Consider the following reaction assuming it occurs at STP:

$CH_4(g) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(g)$

a. What is the mole ratio of CH_4 to H_2O?

$1\ mol\ CH_4 : 2\ mol\ H_2O$

b. How many moles of H_2O are formed when 5 mol CH_4 completely react?

$$5\ mol\ CH_4 \times \frac{2\ mol\ H_2O}{1\ mol\ CH_4} = 10\ mol\ H_2O$$

c. How many moles of CH_4 are consumed when 0.4 mol H_2O are produced?

$$0.4\ mol\ H_2O \times \frac{1\ mol\ CH_4}{2\ mol\ H_2O} = 0.2\ mol\ CH_4$$

d. What is the mole ratio of O_2 to CO_2?

$2\ mol\ O_2 : 1\ mol\ CO_2$

e. How many moles of O_2 are consumed when 3 mol CO_2 are produced?

$$3\ mol\ CO_2 \times \frac{2\ mol\ O_2}{1\ mol\ CO_2} = 6\ mol\ O_2$$

f. How many moles of CO_2 are produced when 0.50 mol O_2 completely react?

$$0.50\ mol\ O_2 \times \frac{1\ mol\ CO_2}{2\ mol\ O_2} = 0.25\ mol\ CO_2$$

g. What is the mole ratio of CH_4 to O_2?

$1\ mol\ CH_4 : 2\ mol\ O_2$

h. How many grams of CH_4 will react completely with 16 g O_2?

$$16\ g\ O_2 \times \frac{1\ mol\ O_2}{32\ g\ O_2} \times \frac{1\ mol\ CH_4}{2\ mol\ O_2} \times \frac{16\ g\ CH_4}{1\ mol\ CH_4} = 4.0\ g\ CH_4$$

i. How many grams of O_2 are required to react with 6.4g CH_4?

$$6.4\ g\ CH_4 \times \frac{1\ mol\ CH_4}{16.0\ g\ CH_4} \times \frac{2\ mol\ O_2}{1\ mol\ CH_4} \times \frac{32\ g\ O_2}{1\ mol\ O_2} = 26\ g$$

j. What is the mole ratio of CO_2 to H_2O?

$1 : 2$