Stoichiometry Worksheet 3

Consider the following equation:

$$Mg(OH)_{2(s)} + 2\ HBr_{(aq)} \rightarrow MgBr_{2(aq)} + 2\ H_2O_{(l)}$$

1) What type of chemical reaction is taking place? _____

2) How many milliliters of 0.225 M HBr would be needed to react completely with 3.26 grams of magnesium hydroxide?

3) If 31.6 grams of magnesium hydroxide is combined with 68.0 mL of 0.725 M HBr, which is the limiting reagent? How many grams of magnesium bromide would be formed?

4) How many grams of the excess reagent will be left over after the reaction in part 3 is complete?

Solutions

Consider the following equation:

$$Mg(OH)_{2(s)} + 2\ HBr_{(aq)} \rightarrow MgBr_{2(aq)} + 2\ H_2O_{(l)}$$

1) What type of chemical reaction is taking place? neutralization reaction

2) How many milliliters of 0.225 M HBr would be needed to react completely with 3.26 grams of magnesium hydroxide?

$$3.26\ g\ Mg(OH)_2 \times \frac{1\ mole\ Mg(OH)_2}{58.32\ g\ Mg(OH)_2} \times \frac{2\ mole\ HBr}{1\ mole\ Mg(OH)_2} \times \frac{1\ L\ HBr}{0.255\ mole\ HBr} \times \frac{1000mL\ HBr}{1\ L\ HBr} =$$

$$= 438\ mL\ HBr$$

3) If 31.6 grams of magnesium hydroxide is combined with 68.0 mL of 0.725 M HBr, which is the limiting reagent? How many grams of magnesium bromide would be formed?

$$31.6\ g\ Mg(OH)_2 \times \frac{1\ mole\ Mg(OH)_2}{58.32\ g\ Mg(OH)_2} = 0.54184\ mole\ Mg(OH)_2$$

$$68.0\ mL\ HBr \times \frac{1\ L\ HBr}{1000\ mL\ HBr} \times \frac{0.725\ mole\ HBr}{1\ L\ HBr} = 0.0493\ mole\ HBr$$

HBr is the limiting reagent.

$$0.0493\ mole\ HBr \times \frac{1\ mole\ MgBr_2}{2\ mole\ HBr} \times \frac{184.11\ g\ MgBr_2}{1\ mole\ MgBr_2} = 4.54\ g\ MgBr_2$$

4) How many grams of the excess reagent will be left over after the reaction in part 3 is complete?

$$0.0493\ mole\ HBr \times \frac{1\ mole\ Mg(OH)_2}{2\ mole\ HBr} \times \frac{58.32\ g\ Mg(OH)_2}{1\ mole\ Mg(OH)_2} = 1.44\ g\ Mg(OH)_2$$

$$31.6\ g\ Mg(OH)_2 - 1.44\ g\ Mg(OH)_2 = 30.2\ g\ Mg(OH)_2$$