

Stoichiometry worksheet #3

1.
$$\frac{24\text{g NaCl} \mid 1\text{mol} \mid 1\text{ Na}_2\text{O} \mid 62\text{g}}{58\text{g} \mid 2\text{ NaCl} \mid 1\text{mol}} = 12.8\text{g Na}_2\text{O}$$

2.
$$\frac{53\text{g MgO} \mid 1\text{mol} \mid 1\text{ MgCl}_2 \mid 6.02 \times 10^{23}}{40\text{g} \mid 1\text{ MgO} \mid 1\text{mol}} = 7.98 \times 10^{23} \text{ molecules}$$

3. Find mass first:

$$\frac{25\text{mL MgO} \mid 2.4\text{g} \mid 1\text{mol} \mid 1\text{ Na}_2\text{O} \mid 62\text{g}}{1\text{ mL} \mid 40\text{g} \mid 1\text{ MgO} \mid 1\text{mol}} =$$

93g Na₂O

4. Work out both amounts.

$$\frac{10\text{g NaCl} \mid 1\text{mol} \mid 1\text{ MgCl}_2 \mid 94\text{g}}{58\text{g} \mid 2\text{ NaCl} \mid 1\text{mol}} = 8.1\text{g MgCl}_2$$

$$\frac{10\text{g MgO} \mid 1\text{mol} \mid 1\text{ MgCl}_2 \mid 94\text{g}}{40\text{g} \mid 1\text{ MgO} \mid 1\text{mol}} = 23.5\text{g MgCl}_2$$

Lowest answer is amount produced: 8.1g MgCl₂

so Limiting reactant is NaCl.

To find excess, convert limiting reactant into the excess!

$$\frac{10\text{g NaCl} \mid 1\text{mol} \mid 1\text{ MgO} \mid 40\text{g}}{58\text{g} \mid 2\text{ NaCl} \mid 1\text{mol}} = 3.4\text{g}$$

↑
amount used.

10g
- 3.4g
6.6g MgO

$$5. \quad \frac{14 \text{ moles } K_2O \mid 2 K_3N \mid 131 g}{3 K_2O \mid 1 \text{ mol}} = 1223 g K_3N$$

$$6. \quad \frac{25 g Mg_3N_2 \mid 1 \text{ mol} \mid 3 MgO \mid 40 g}{100 g \mid 1 Mg_3N_2 \mid 1 \text{ mol}} = 30 g MgO$$

$$\frac{50 g K_2O \mid 1 \text{ mol} \mid 3 MgO \mid 40 g}{94 g \mid 3 K_2O \mid 1 \text{ mol}} = 21.3 g MgO$$

Lowest answer: 21.3 g MgO

Limiting reactant: 50 g K₂O

Now find excess:

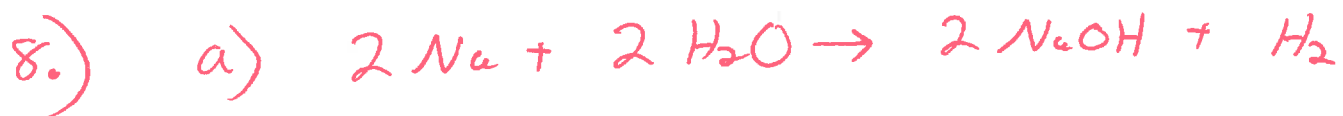
$$\frac{50 g K_2O \mid 1 \text{ mol} \mid 1 Mg_3N_2 \mid 100 g}{94 g \mid 3 K_2O \mid 1 \text{ mol}} = 17.7 g$$

so its $25 - 17.7 =$ 7.3 g excess Mg₃N₂

7.) Find theoretical yield:

$$\frac{160 g NaOH \mid 1 \text{ mol} \mid 3 NaCl \mid 58 g}{40 g \mid 4 NaOH \mid 1 \text{ mol}} = 174 g$$

so its: $\frac{160 g NaCl}{174 g NaCl} \times 100 =$ 92%



b)
$$\frac{5 \text{ mole NaOH}}{2 \text{ NaOH}} \times \frac{2 \text{ Na}}{2 \text{ NaOH}} = 5 \text{ moles Na}$$

c)
$$\frac{5 \text{ g H}_2\text{O}}{18 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{O}}{2 \text{ H}_2\text{O}} \times \frac{2 \text{ H}_2}{2 \text{ H}_2\text{O}} = 0.277 \text{ mol H}_2$$