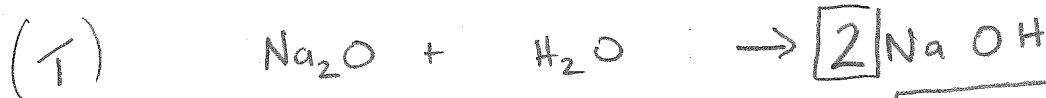


Stoichiometry Quiz

Name: KEY
Block: _____

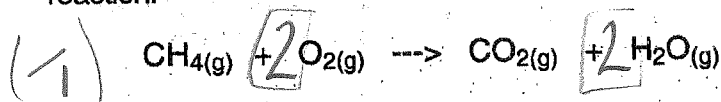
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- ① Sodium oxide and water produces sodium hydroxide. How many moles of water are needed to produce 4.00 moles of sodium hydroxide?



(1)
$$4.00 \text{ mol NaOH} \left(\frac{1 \text{ mol H}_2\text{O}}{2 \text{ mol NaOH}} \right) = \boxed{2.00 \text{ mol H}_2\text{O}}$$

- ② Many cars now use methane (CH₄) to run their engines according to the following reaction:



a. Balance the reaction.

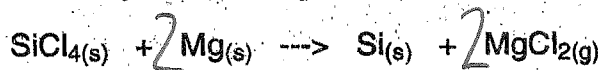
b. How many moles of oxygen will react with 4.00 moles of methane?

(1)
$$4.00 \text{ mol CH}_4 \left(\frac{2 \text{ mol O}_2}{1 \text{ mol CH}_4} \right) = \boxed{8.00 \text{ mol O}_2}$$

c. How many grams of carbon dioxide will be produced when 4.00 moles of methane reacts?

(2)
$$4.00 \text{ mol CH}_4 \left(\frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} \right) \left(\frac{44.0 \text{ g}}{1 \text{ mol CO}_2} \right) = \boxed{176 \text{ g}}$$

3. Silicon is a very important element for the computer industry. One way to obtain pure silicon is by the following reaction:

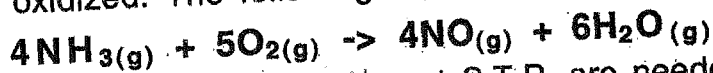


How many mole and grams of silicon will be produced from reacting 100. g of SiCl₄?

(2)
$$100. \text{ g} \left(\frac{1 \text{ mol SiCl}_4}{170.1 \text{ g}} \right) \left(\frac{1 \text{ mol Si}}{1 \text{ mol SiCl}_4} \right) = \boxed{0.588 \text{ mol Si}}$$

(1)
$$\downarrow \times \left(\frac{28.1 \text{ g}}{1 \text{ mol Si}} \right) = \boxed{16.5 \text{ g Si}}$$

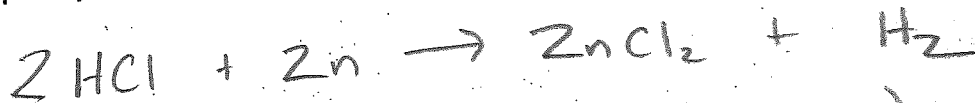
- ④ In the first step of the Ostwald process for making nitric acid, ammonia is oxidized. The following reaction occurs.



- A) How many litres of NH_3 at S.T.P. are needed to react with 12.0 L of O_2 also at S.T.P?

$$(3) \quad 12.0\text{L} \left(\frac{\text{mol O}_2}{22.4\text{L}} \right) \left(\frac{4\text{mol NH}_3}{5\text{mol O}_2} \right) \left(\frac{22.4\text{L}}{\text{mol}} \right) = \boxed{9.60\text{L NH}_3}$$

- ⑤ Hydrochloric acid reacts with zinc in a single replacement reaction. The concentration of the acid is 0.84 M. The chemist working with the reaction needs 25 mL of the acid to completely react the zinc. Calculate the number of moles in the zinc sample.



$$(2) \quad \begin{array}{l} 0.84\text{M} \\ 0.025\text{L} \end{array} \quad \text{mol HCl} = M \times L = 0.021\text{mol}$$

$$0.021\text{mol HCl} \left(\frac{1\text{mol Zn}}{2\text{mol HCl}} \right) = \boxed{0.011\text{mol Zn}}$$

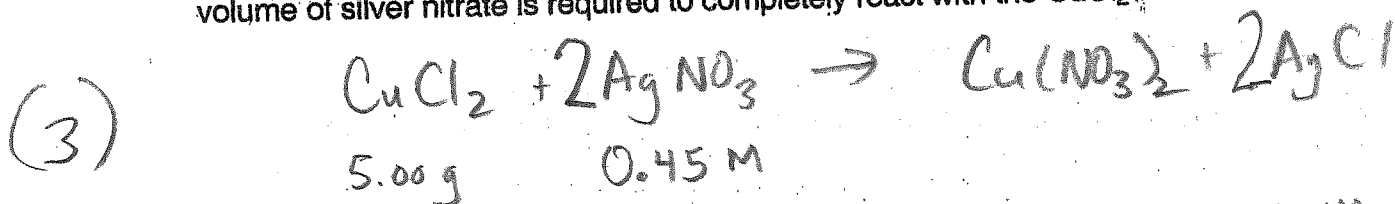
- ⑥ Calculate the concentration of sodium bromide if 35.4 mL will react with 10.0 mL of 0.58 M AgNO_3 .

$$(2) \quad \begin{array}{l} \text{NaBr} \\ 0.0354\text{L} \\ 0.0058\text{mol} \end{array} + \begin{array}{l} \text{AgNO}_3 \\ 0.58\text{M} \\ 0.010\text{L} \end{array} \rightarrow \text{NaNO}_3 + \text{AgBr}$$

$$[\text{NaBr}] = \frac{0.0058\text{mol}}{0.0354\text{L}} = \boxed{0.16\text{M}}$$

$$\text{mol} = (0.58)(0.010) = 0.0058\text{mol}$$

- ⑦ A chemist reacts 5.00 grams of CuCl_2 with a 0.45 M solution of silver nitrate. What volume of silver nitrate is required to completely react with the CuCl_2 ?



$$5.00\text{g} \left(\frac{\text{mol CuCl}_2}{134.5\text{g}} \right) \left(\frac{2\text{mol AgNO}_3}{1\text{mol CuCl}_2} \right) = 0.0743 \dots \text{mol AgNO}_3$$

$$L = \frac{\text{mol}}{L} = \frac{0.0743 \dots \text{mol}}{0.45\text{M}} = \boxed{0.17\text{M}}$$