

## Conversion Factor Introduction

1. Find the mass (in g) of 34.5 kg of H<sub>2</sub>O

$$34.5 \text{ kg H}_2\text{O} \times \frac{1000 \text{ g H}_2\text{O}}{1 \text{ kg H}_2\text{O}} = 34500 \text{ g H}_2\text{O}$$

$$1000 \text{ g H}_2\text{O} = 1 \text{ kg H}_2\text{O}$$

2. Find the volume (in L) of 284 mL of water

$$284 \text{ mL H}_2\text{O} \times \frac{1 \text{ L H}_2\text{O}}{1000 \text{ mL H}_2\text{O}} = 0.284 \text{ L H}_2\text{O}$$

$$1 \text{ L H}_2\text{O} = 1000 \text{ mL H}_2\text{O}$$

3. Find the mass (in g) of 0.00500 mol of gold

$$0.00500 \text{ mol Au} \times \frac{196.97 \text{ g Au}}{1 \text{ mol Au}} = 0.985 \text{ mol Au}$$

$$196.97 \text{ g Au} = 1 \text{ mol Au}$$

4. Find the amount (in mol) of 35.9 g of scandium

$$35.9 \text{ g Sc} \times \frac{1 \text{ mol Sc}}{44.96 \text{ g Sc}} = 0.798 \text{ mol Sc}$$

$$1 \text{ mol Sc} = 44.96 \text{ g Sc}$$

5. Find the number of atoms in 0.00500 mol of gold

$$0.00500 \text{ mol Au} \times \frac{6.022 \times 10^{23} \text{ atoms Au}}{1 \text{ mol Au}} = 3.01 \times 10^{21} \text{ atoms Au}$$

$$6.022 \times 10^{23} \text{ atoms Au} = 1 \text{ mol Au}$$

6. Find the amount (in mol) of  $4.5 \times 10^{22}$  molec of water

$$4.52 \times 10^{22} \text{ molec H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{6.022 \times 10^{23} \text{ molec H}_2\text{O}} = 0.0751 \text{ mol H}_2\text{O}$$

$$1 \text{ mol H}_2\text{O} = 6.022 \times 10^{23} \text{ molec H}_2\text{O}$$

7. Find the mass (in g) of 0.422 mol of glucose

$$0.422 \text{ mol C}_6\text{H}_{12}\text{O}_6 \times \frac{180.18 \text{ g C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} = 76.0 \text{ g C}_6\text{H}_{12}\text{O}_6$$

$$180.18 \text{ g C}_6\text{H}_{12}\text{O}_6 = 1 \text{ mol C}_6\text{H}_{12}\text{O}_6$$

8. Find the amount (in mol) of 25.4 g of  $\text{H}_2\text{SO}_4$

$$25.4 \text{ g H}_2\text{SO}_4 \times \frac{1 \text{ mol H}_2\text{SO}_4}{98.09 \text{ g H}_2\text{SO}_4} = 0.259 \text{ mol H}_2\text{SO}_4$$

$$1 \text{ mol H}_2\text{SO}_4 = 98.09 \text{ g H}_2\text{SO}_4$$

9. Find the number of molecules in 300 g of  $\text{O}_2$

$$300 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.00 \text{ g O}_2} \times \frac{6.022 \times 10^{23} \text{ molec O}_2}{1 \text{ mol O}_2} = 5.65 \times 10^{24} \text{ molec O}_2$$

$$1 \text{ mol O}_2 = 32.00 \text{ g O}_2 \quad / \quad 6.022 \times 10^{23} \text{ molec O}_2 = 1 \text{ mol O}_2$$

10. Find the amount (in mol) of 250 mL of water (1 mL of water has a mass of 1 g)

$$250 \text{ mL H}_2\text{O} \times \frac{1 \text{ g H}_2\text{O}}{1 \text{ mL H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} = 13.9 \text{ mol H}_2\text{O}$$

$$1 \text{ g H}_2\text{O} = 1 \text{ mL H}_2\text{O} \quad / \quad 1 \text{ mol H}_2\text{O} = 18.02 \text{ g H}_2\text{O}$$

11. Find the mass (in g) of  $1 \times 10^{24}$  molec of  $\text{CO}_2$

$$1.00 \times 10^{24} \text{ molec CO}_2 \times \frac{1 \text{ mol CO}_2}{6.022 \times 10^{23} \text{ molec CO}_2} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = 73.1 \text{ g CO}_2$$

$$1 \text{ mol CO}_2 = 6.022 \times 10^{23} \text{ molec CO}_2 \quad / \quad 44.01 \text{ g CO}_2 = 1 \text{ mol CO}_2$$

12. Find the number of molecules in 3.00 g of  $\text{CH}_2\text{O}$

$$3.00 \text{ g CH}_2\text{O} \times \frac{1 \text{ mol CH}_2\text{O}}{30.03 \text{ g CH}_2\text{O}} \times \frac{6.022 \times 10^{23} \text{ molec CH}_2\text{O}}{1 \text{ mol CH}_2\text{O}} = 6.02 \text{ molec CH}_2\text{O}$$

$$1 \text{ mol CH}_2\text{O} = 30.03 \text{ g CH}_2\text{O} \quad / \quad 6.022 \times 10^{23} \text{ molec CH}_2\text{O} = 1 \text{ mol CH}_2\text{O}$$

13. Find the mass (in g) of  $1.27 \times 10^{23}$  atoms of Cu

$$1.27 \times 10^{23} \text{ atoms Cu} \times \frac{1 \text{ mol Cu}}{6.022 \times 10^{23} \text{ atoms Cu}} \times \frac{63.55 \text{ g Cu}}{1 \text{ mol Cu}} = 13.4 \text{ g Cu}$$

14. Find the number of oxygen molecules that could be extracted by electrolysis from 45 mL of pure water

$$45 \text{ mL H}_2\text{O} \times \frac{1 \text{ g H}_2\text{O}}{1 \text{ mL H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g H}_2\text{O}} \times \frac{6.022 \times 10^{23} \text{ molec H}_2\text{O}}{1 \text{ mol H}_2\text{O}}$$

$$\times \frac{1 \text{ atom O}}{1 \text{ molec H}_2\text{O}} \times \frac{1 \text{ molec O}_2}{2 \text{ atoms O}} = 7.52 \times 10^{23} \text{ molec O}_2$$