

# Moles and Solutions

Use a calculator and a periodic table to answer the following questions.

1. Calculate the concentration, in  $\text{mol dm}^{-3}$ , of the following solutions. Give each answer to an appropriate number of significant figures.

a. A solution formed by dissolving 0.5 moles of sodium chloride in  $1 \text{ dm}^3$  of water.

concentration = \_\_\_\_\_  $\text{mol dm}^{-3}$

b. A solution formed by dissolving 0.125 moles of potassium manganate(VII) ( $\text{KMnO}_4$ ) in  $100 \text{ cm}^3$  of water.

concentration = \_\_\_\_\_  $\text{mol dm}^{-3}$

c. A solution formed by dissolving 20.0 g of sodium hydroxide ( $\text{NaOH}$ ) in  $250 \text{ cm}^3$  of water.

concentration = \_\_\_\_\_  $\text{mol dm}^{-3}$

d. A solution formed by dissolving 26.9 g of copper(II) chloride ( $\text{CuCl}_2$ ) in  $300 \text{ cm}^3$  of water.

concentration = \_\_\_\_\_  $\text{mol dm}^{-3}$

2. Calculate the number of moles of solute in each of the following solutions. Give each answer to an appropriate number of significant figures.

a.  $1 \text{ dm}^3$  of  $0.5 \text{ mol dm}^{-3}$  iron(II) sulfate ( $\text{FeSO}_4$ ) solution.

number of moles = \_\_\_\_\_ mol

b.  $100 \text{ cm}^3$  of  $1.5 \text{ mol dm}^{-3}$  potassium chloride (KCl) solution.

number of moles = \_\_\_\_\_ mol

c.  $250 \text{ cm}^3$  of  $73 \text{ g dm}^{-3}$  hydrochloric acid (HCl) solution

number of moles = \_\_\_\_\_ mol

d.  $40 \text{ cm}^3$  of a solution that is prepared by dissolving 21 g of sodium fluoride (NaF) in  $500 \text{ cm}^3$  of water.

number of moles = \_\_\_\_\_ mol

3. A student is preparing a  $0.500 \text{ mol dm}^{-3}$  solution of potassium nitrate ( $\text{KNO}_3$ ). Calculate the mass, in grams, of potassium nitrate the student should dissolve in  $100 \text{ cm}^3$  of water.

Give your answer to an appropriate number of significant figures.

mass = \_\_\_\_\_ g

4. A student is preparing a  $0.125 \text{ mol dm}^{-3}$  solution of lithium hydroxide ( $\text{LiOH}$ ). Calculate the volume of water, in  $\text{cm}^3$ , which is needed to dissolve 2.39 g of lithium hydroxide to prepare this solution.

volume = \_\_\_\_\_  $\text{cm}^3$

5. A student completely dissolved 49.05 g of an unidentified white solid in  $500 \text{ cm}^3$  of water. The student then carried out a titration and determined that a  $25.0 \text{ cm}^3$  sample of the solution contained 0.0250 moles of the solid.

Calculate the relative molecular mass ( $M_r$ ) of the solid.

relative molecular mass = \_\_\_\_\_