



Topic 2 Exercise 2 - solutions

Using molarities and concentrations

1. Calculate the number of moles of H_2SO_4 in 50 cm^3 of a 0.50 mol dm^{-3} solution.
2. Calculate the number of moles of FeSO_4 in 25 cm^3 of a 0.2 mol dm^{-3} solution.
3. Calculate the mass of KMnO_4 in 25 cm^3 of a 0.02 mol dm^{-3} solution.
4. Calculate the mass of $\text{Pb}(\text{NO}_3)_2$ in 30 cm^3 of a 0.1 mol dm^{-3} solution.
5. What is the molarity of 1.06 g of H_2SO_4 in 250 cm^3 of solution?
6. What is the molarity of 15.0 g of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ in 250 cm^3 of solution?
7. What volume of a $0.833 \text{ mol dm}^{-3}$ solution of H_2O_2 will be required to make 250 cm^3 of a $0.100 \text{ mol dm}^{-3}$ solution?
8. What volume of a 0.50 mol dm^{-3} solution of HCl will be required to make 100 cm^3 of a 0.050 M solution?
9. How many moles of NaCl are there in 25 cm^3 of a 50 g dm^{-3} solution?

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Reacting masses and volumes

1. 25 cm^3 of a solution of 0.1 mol dm^{-3} NaOH reacts with 50 cm^3 of a solution of hydrochloric acid. What is the molarity of the acid?
2. 25.0 cm^3 of a 0.10 mol dm^{-3} solution of sodium hydroxide was titrated against a solution of hydrochloric acid of unknown concentration. 27.3 cm^3 of the acid was required. What was the concentration of the acid?
3. 10 cm^3 of a solution of NaCl react with 15 cm^3 of a 0.02 mol dm^{-3} solution of AgNO_3 . What is the concentration of the NaCl solution in g dm^{-3} ?
4. 25 cm^3 of a 0.1 mol dm^{-3} solution of an acid H_xA reacts with 75 cm^3 of a 0.1 mol dm^{-3} solution of NaOH. What is the value of x?
Equation: $\text{H}_x\text{A} + x\text{NaOH} \rightarrow \text{Na}_x\text{A} + x\text{H}_2\text{O}$
5. A solution of hydrochloric acid of volume 25.0 cm^3 was pipetted onto a piece of marble which is calcium carbonate. When all action had ceased, 1.30g of the marble had dissolved. Find the concentration of the acid
Equation: $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
6. What volume of 0.1 mol dm^{-3} hydrochloric acid would be required to dissolve 2.3 g of calcium carbonate?
Equation: $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
7. 2.05 g of the carbonate of an unknown alkali metal (X_2CO_3) required 8.9 cm^3 of 2.0 mol dm^{-3} hydrochloric acid to completely dissolve it. What was the relative atomic mass of the metal and which metal was it?
Equation: $\text{X}_2\text{CO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow 2\text{XCl}(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
8. 3.2 g of hydrated sodium carbonate, $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$, was dissolved in water and the resulting solution was titrated against 1.0 mol dm^{-3} hydrochloric acid. 22.4 cm^3 of the acid was required. What is the value of x?