

IGCSE Chemistry 0620 Paper 3 Practice

Paper (Core)

Total: 80 marks · 1 hour 15 minutes · 6 questions · 33 parts

Question 1 · States of matter and separation [14]

- a) Name the change of state from solid to liquid and from gas to liquid. [2]
- b) After a perfume bottle is opened, the smell reaches the other side of the room. Explain this in terms of particles, and explain why diffusion is faster at a higher temperature. [3]
- c) Rock salt is mixed with sand. Describe the three main steps needed to obtain dry pure salt from rock salt. [3]
- d) A 25.0 g impure sample gives 18.0 g of pure sodium chloride. Calculate the percentage purity by mass. [2]
- e) A 250 g salt solution contains 12.0% sodium chloride by mass. Calculate the mass of sodium chloride and the mass of water. [2]
- f) A laboratory uses melting point to check purity. How does the melting point of a pure substance differ from that of an impure one? [2]

Question 2 · Atomic structure and the Periodic Table [13]

- a) Define proton number, mass number and isotope. [3]
- b) Chlorine has the isotopes $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$. Calculate the number of neutrons in each and explain why they have identical chemical properties. [3]
- c) A sample of chlorine contains 75% Cl-^{35} and 25% Cl-^{37} . Calculate the relative atomic mass of chlorine to one decimal place. [3]
- d) Chlorine has proton number 17. Write its electron arrangement and state its group and period. [2]
- e) Describe how a chlorine atom forms a chloride ion, and give the ion electron arrangement and charge. [2]

Question 3 · Ionic bonding, acids and salts [14]

- a) Using sodium chloride as an example, explain how ionic bonding is formed. [3]

- b) Explain why sodium chloride has a high melting point and why only the molten or aqueous form conducts electricity. [2]
- c) Write a balanced equation, with state symbols, for the reaction between calcium carbonate and dilute hydrochloric acid. [3]
- d) 10.0 g of calcium carbonate reacts completely with excess acid. Calculate the mass of carbon dioxide formed. (M: $\text{CaCO}_3 = 100$, $\text{CO}_2 = 44$) [2]
- e) What volume does that carbon dioxide occupy at room temperature and pressure? (molar volume = $24 \text{ dm}^3 \text{ mol}^{-1}$) [2]
- f) Which salt is formed when nitric acid reacts with potassium hydroxide? How can an indicator show that neutralisation is just complete? [2]

Question 4 · Rates of reaction and energy changes [14]

- a) State two ways of increasing the rate of reaction between marble chips (calcium carbonate) and dilute hydrochloric acid. [2]
- b) Use collision theory to explain why crushing the marble speeds up the reaction. [3]
- c) An experiment collects 120 cm^3 of gas in 40 s, of which 80 cm^3 is collected in the first 20 s. Calculate the average rate overall and the rate over the first 20 s. [3]
- d) How would you tell from an experiment that a reaction is exothermic, and is its ΔH positive or negative? [2]
- e) A fuel has $\Delta H = -890 \text{ kJ mol}^{-1}$ for combustion. How much energy is released when 0.050 mol burns completely? [2]
- f) State two key points about a catalyst (its effect on rate and what happens to it). [2]

Question 5 · Organic chemistry [13]

- a) Give the general formula of the alkanes, the molecular formula of butane, and the homologous series and formula of ethene. [3]
- b) Write the balanced equation for the complete combustion of propane. [3]
- c) At the same temperature and pressure, what volume of carbon dioxide is formed when 2.0 dm^3 of propane burns completely? [2]
- d) Ethene is used to make poly(ethene). Name the reaction, give the repeat unit and state the conditions. [3]

e) How could bromine water be used to distinguish ethene from ethane? State the observation. [2]

Question 6 · Air, electrolysis and the environment [12]

a) Give the approximate percentage by volume of nitrogen and of oxygen in dry air. [2]

b) Copper(II) sulfate solution is electrolysed with copper electrodes. Give the cathode reaction, the anode product and the colour change of the solution. [3]

c) Electrolysis deposits 0.50 mol of copper. What mass is this? (M: Cu = 63.5) [2]

d) Explain how burning fossil fuels causes acid rain, and state one effect of acid rain. [3]

e) Give two gas tests: (i) carbon dioxide; (ii) water vapour. [2]