

Cambridge IGCSE · Chemistry (0620) · Mock Paper Set 1

Mock Paper Set 1

Paper 2 · Paper 4 · Paper 6, with worked solutions and mark schemes

Extended tier (Core and Supplement content), written for the Cambridge IGCSE Chemistry 0620 syllabus for examinations in 2026, 2027 and 2028.

What is inside this set

Paper	Format	Time	Marks
Data sheet	The Periodic Table of Elements and the molar gas volume, used with Papers 2 and 4	-	-
Paper 2 · Multiple Choice (Extended)	40 four-option questions, one mark each	45 minutes	40
Paper 4 · Theory (Extended)	7 compulsory structured questions; answer in the spaces provided	1 hour 15 minutes	80
Paper 6 · Alternative to Practical	4 compulsory questions on experimental skills, including a graph and a plan; notes for use in qualitative analysis at the end of the paper	1 hour	40
Solutions	Key and explanation for every MCQ; worked solutions and mark schemes for Papers 4 and 6; topic map; revision tables	-	-

How to use this set

1. Sit each paper in one go, timed, with a calculator, ruler and pencil. No notes. Use the Data sheet for relative atomic masses.
2. Write your answers on the paper (Paper 2: on the answer grid at the end of the paper).
3. Mark it yourself with the mark scheme: give a mark only where your answer matches a marking point. Each green badge (B1, C1, A1) is one mark.
4. Read the worked solution for every question you dropped marks on, then use the topic map to go back to the right chapter of the notes.

Mark-scheme labels

B1 independent mark**C1** method mark, given when the final answer is wrong or missing (a correct final answer scores all the marks)**A1** final answer, with the unit where one is needed

grey notes: allow / ignore / do not allow

ecf = error carried forward: a later mark can still be scored using your own (wrong) earlier answer

r.t.p. = room temperature and pressure

Notes Bazar independent practice papers. These papers are not endorsed by, affiliated with or produced by Cambridge University Press & Assessment. "Cambridge IGCSE" is used only to identify the syllabus. All questions, contexts, data and diagrams are original. Grade boundaries are set by Cambridge for each live series and are not reproduced here.

Data sheet: The Periodic Table of Elements

For use with Paper 2 and Paper 4 of this set. Relative atomic masses are rounded as on the examination Periodic Table (chlorine 35.5).

Group																	
I																VIII	
1	2															9	10
1 H 1																2 He 4	
3 Li 7	4 Be 9															5 B 11	6 C 12
11 Na 23	12 Mg 24															7 N 14	8 O 16
19 K 39	20 Ca 40	21 Sc 45	22 Ti 48	23 V 51	24 Cr 52	25 Mn 55	26 Fe 56	27 Co 59	28 Ni 59	29 Cu 64	30 Zn 65	31 Ga 70	32 Ge 73	33 As 75	34 Se 79	35 Br 80	36 Kr 84
37 Rb 85	38 Sr 88	39 Y 89	40 Zr 91	41 Nb 93	42 Mo 96	43 Tc -	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	57-71 Lanthanoids	72 Hf 178	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po -	85 At -	86 Rn -
87 Fr -	88 Ra -	89-103 actinoids	104 Rf -	105 Db -	106 Sg -	107 Bh -	108 Hs -	109 Mt -	110 Ds -	111 Rg -	112 Cn -	113 Nh -	114 Fl -	115 Mc -	116 Lv -	117 Ts -	118 Og -

Lanthanoids	57 La 139	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm -	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
actinoids	89 Ac -	90 Th 232	91 Pa 231	92 U 238	93 Np -	94 Pu -	95 Am -	96 Cm -	97 Bk -	98 Cf -	99 Es -	100 Fm -	101 Md -	102 No -	103 Lr -

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

CHEMISTRY**0620 · Mock Set 1****Paper 2 Multiple Choice (Extended)****45 minutes**

Name

Centre no.

Candidate no.

You will need: the answer grid at the end of this paper · soft pencil (type B or HB) · soft clean eraser · calculator

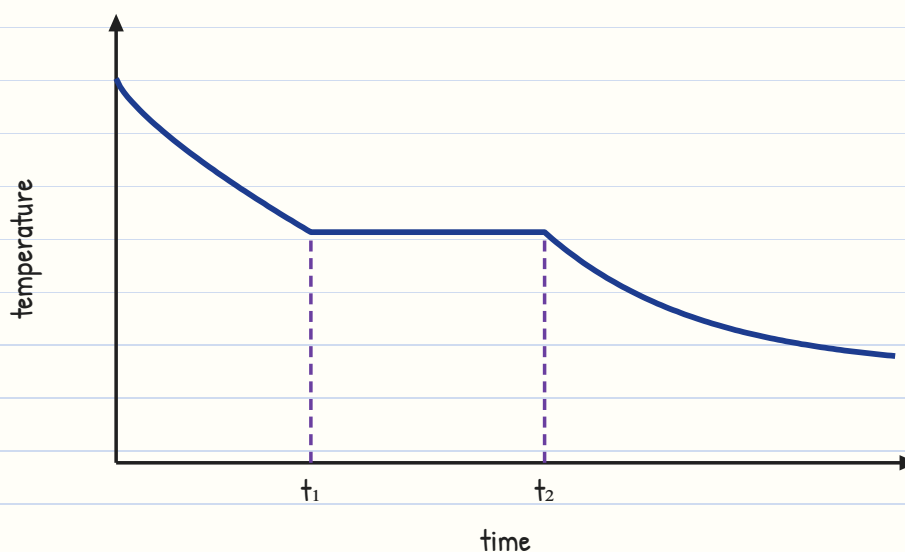
INSTRUCTIONS

- There are forty questions on this paper. Answer all questions.
- For each question there are four possible answers A, B, C and D. Choose the one you consider correct and record your choice in soft pencil on the answer grid.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed on the Data sheet at the front of this set.

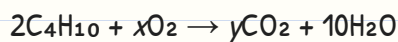
1. A sample of a pure substance is a liquid at 90°C . It is allowed to cool, and its temperature is recorded every minute. The graph shows the results.



Which statement describes what happens between t_1 and t_2 ?

- A The liquid is boiling, and energy is taken in from the surroundings.
- B The liquid is freezing, and energy is given out to the surroundings.
- C The liquid is freezing, and energy is taken in from the surroundings.
- D The gas is condensing, and energy is given out to the surroundings.

8. Butane burns completely in oxygen.



Which values of x and y balance the equation?

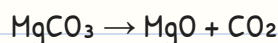
	x	y
A	9	4
B	13	4
C	13	8
D	26	8

9. Urea, $\text{CO}(\text{NH}_2)_2$, is used as a fertiliser.

What is the percentage by mass of nitrogen in urea?

- A 23.3% B 46.7% C 28.0% D 53.3%

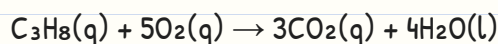
10. Magnesium carbonate decomposes when it is heated.



What is the mass of magnesium oxide formed when 21.0 g of magnesium carbonate is completely decomposed?

- A 10.0 g B 8.4 g C 11.0 g D 21.0 g

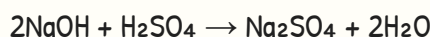
11. Propane burns completely in oxygen.



What volume of oxygen is needed to burn 1.5 dm³ of propane completely? All volumes are measured at r.t.p.

- A 1.5 dm³ B 4.5 dm³ C 7.5 dm³ D 10.5 dm³

12. 25.0 cm³ of 0.200 mol/dm³ aqueous sodium hydroxide is exactly neutralised by dilute sulfuric acid of concentration 0.100 mol/dm³.



What volume of the sulfuric acid is needed?

- A 12.5 cm³ B 50.0 cm³ C 100 cm³ D 25.0 cm³

13. An oxide of nitrogen contains 30.4% nitrogen by mass. Its relative molecular mass is 92.

What is its molecular formula?

- A NO₂ B N₂O₃ C N₂O₄ D N₂O₅

14. Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

Which row is correct?

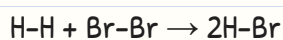
	product at the anode	product at the cathode	substance left in solution
A	chlorine	hydrogen	sodium hydroxide
B	chlorine	sodium	water only
C	oxygen	hydrogen	sodium chloride
D	hydrogen	chlorine	sodium hydroxide

15. A steel key is to be electroplated with nickel.

Which row shows how the electroplating cell is set up?

	<i>cathode</i>	<i>anode</i>	<i>electrolyte</i>
A	nickel	steel key	aqueous nickel(II) sulfate
B	steel key	nickel	aqueous nickel(II) sulfate
C	steel key	carbon	dilute sulfuric acid
D	steel key	nickel	aqueous sodium sulfate

16. Hydrogen reacts with bromine.



<i>bond</i>	<i>bond energy in kJ/mol</i>
H-H	436
Br-Br	193
H-Br	366

What is the energy change for this reaction?

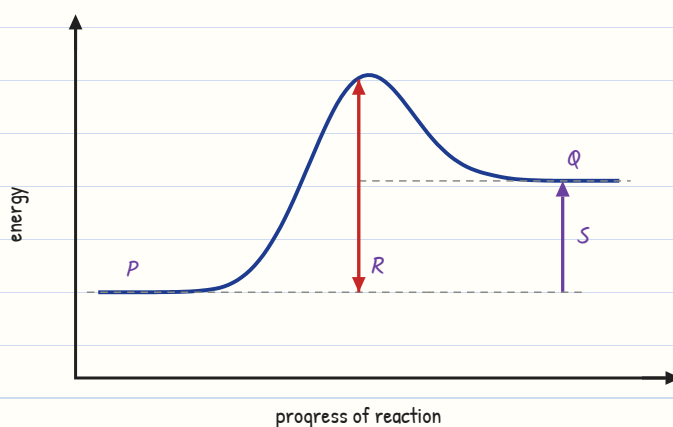
A +263 kJ/mol

B +103 kJ/mol

C -1361 kJ/mol

D -103 kJ/mol

17. The diagram shows the reaction pathway diagram for a reaction. Four energy labels P, Q, R and S are shown.



Which row is correct?

	<i>type of reaction</i>	<i>label showing the activation energy</i>
A	endothermic	R
B	endothermic	S
C	exothermic	R
D	exothermic	S

18. Excess marble chips (calcium carbonate) react with 50 cm³ of 1.0 mol/dm³ hydrochloric acid at 20 °C.

The volume of carbon dioxide is measured until the reaction stops.

Which change makes the reaction slower but gives the same final volume of carbon dioxide?

- A using 50 cm³ of 0.50 mol/dm³ hydrochloric acid
- B using 100 cm³ of 1.0 mol/dm³ hydrochloric acid
- C using the same mass of larger marble chips
- D warming the acid to 40 °C before adding the marble chips

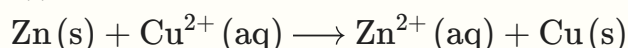
19. Methanol is made from carbon monoxide and hydrogen in a reversible reaction.



Which conditions give the greatest equilibrium yield of methanol?

	<i>temperature</i>	<i>pressure</i>
A	high	high
B	high	low
C	low	low
D	low	high

20. Zinc reacts with aqueous copper(II) ions.



Which row identifies the oxidising agent and the reducing agent?

	<i>oxidising agent</i>	<i>reducing agent</i>
A	Zn	Cu ²⁺
B	Cu ²⁺	Zn
C	Zn ²⁺	Cu
D	Cu	Zn ²⁺

21. Separate solutions of hydrochloric acid and ethanoic acid each have a concentration of 0.10 mol/dm³.

Which statement is correct?

- A Ethanoic acid has the higher pH because it is only partially dissociated in water.
- B Ethanoic acid has the lower pH because each molecule contains four hydrogen atoms.
- C Both acids have the same pH because they have the same concentration.
- D Hydrochloric acid reacts more slowly with magnesium because it is fully dissociated.

22. Oxide Z reacts with dilute hydrochloric acid. It also reacts with hot aqueous sodium hydroxide.

What is Z?

- A magnesium oxide
- B sulfur dioxide
- C zinc oxide
- D carbon monoxide

23. Which salt is best prepared by titrating an acid with an alkali?

- A copper(II) sulfate
- B barium sulfate
- C zinc chloride
- D potassium nitrate

24. An atom of element J has the electronic configuration 2,8,5.

Which row describes J?

	<i>group</i>	<i>period</i>	<i>metal or non-metal</i>
A	III	5	metal
B	V	3	non-metal
C	V	3	metal
D	III	3	non-metal

25. Caesium is an element in Group I, below rubidium.

How does caesium compare with sodium?

	<i>reaction with cold water</i>	<i>melting point</i>
A	more vigorous	lower
B	more vigorous	higher
C	less vigorous	lower
D	less vigorous	higher

26. Four mixtures of aqueous solutions are made.

1	aqueous chlorine + aqueous potassium iodide
2	aqueous bromine + aqueous potassium chloride
3	aqueous iodine + aqueous potassium bromide
4	aqueous bromine + aqueous potassium iodide

In which mixtures does a displacement reaction take place?

A 1 and 2

B 2 and 3

C 3 and 4

D 1 and 4

27. Brass is an alloy of copper and zinc. Brass is harder than pure copper.

Which statement explains this?

A Brass contains covalent bonds between the copper and zinc atoms.

B The zinc atoms are the same size as the copper atoms, so they fit into the lattice.

C Atoms of a different size disrupt the regular layers, so the layers cannot slide over each other easily.

D Brass has no delocalised electrons.

28. Pieces of three metals, W, X and Y, are added to aqueous solutions of their nitrates. ✓ means that a reaction takes place; X means that there is no reaction.

<i>metal</i>	<i>W nitrate(aq)</i>	<i>X nitrate(aq)</i>	<i>Y nitrate(aq)</i>
W	-	✓	✓
X	X	-	X
Y	X	✓	-

What is the order of reactivity of the metals, most reactive first?

A W, X, Y

B W, Y, X

C X, Y, W

D Y, W, X

29. Blocks of magnesium are fixed to a steel water pipe buried in damp soil. The steel does not rust.

Why does the magnesium protect the steel?

- A Magnesium is more reactive than iron, so magnesium loses electrons instead of iron.
- B Magnesium forms a coating over the whole pipe, which keeps out air and water.
- C Magnesium is less reactive than iron, so it does not corrode.
- D Magnesium removes the water from the soil around the pipe.

30. Which statement about the extraction of aluminium is correct?

- A Aluminium is formed at the anode.
- B Aluminium oxide is reduced by carbon in a blast furnace.
- C Aluminium oxide is dissolved in molten cryolite, which lowers the operating temperature.
- D The anodes never need replacing because carbon is inert.

31. Which compound supplies two of the three elements, nitrogen, phosphorus and potassium, that are needed for plant growth?

- A ammonium nitrate
- B ammonium sulfate
- C calcium phosphate
- D potassium nitrate

32. Which reaction takes place in the catalytic converter of a car?

- A $2\text{NO} + 2\text{CO} \rightarrow \text{N}_2 + 2\text{CO}_2$
- B $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$
- C $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$
- D $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

33. Kerosene and diesel oil are fractions obtained from petroleum. Kerosene is collected higher up the fractionating column than diesel oil.

How do the properties of kerosene compare with those of diesel oil?

	<i>boiling point range</i>	<i>viscosity</i>
A	higher	higher
B	lower	lower
C	higher	lower
D	lower	higher

34. How many structural isomers have the molecular formula C_5H_{12} ?

- A 1
- B 2
- C 3
- D 4

35. Ethene is bubbled through aqueous bromine.

Which row describes the type of reaction and the colour change?

	<i>type of reaction</i>	<i>colour change</i>
A	substitution	orange to colourless
B	substitution	no change; stays orange
C	addition	colourless to orange
D	addition	orange to colourless

36. Which row describes the manufacture of ethanol by fermentation?

	<i>temperature</i>	<i>catalyst</i>	<i>rate of production</i>	<i>product</i>
A	300 °C	phosphoric acid	fast	pure ethanol
B	30 °C	enzymes in yeast	slow	aqueous ethanol
C	30 °C	phosphoric acid	slow	pure ethanol
D	300 °C	enzymes in yeast	fast	aqueous ethanol

37. Which ester is formed when propanoic acid reacts with methanol?

A methyl propanoate

B propyl methanoate

C methyl ethanoate

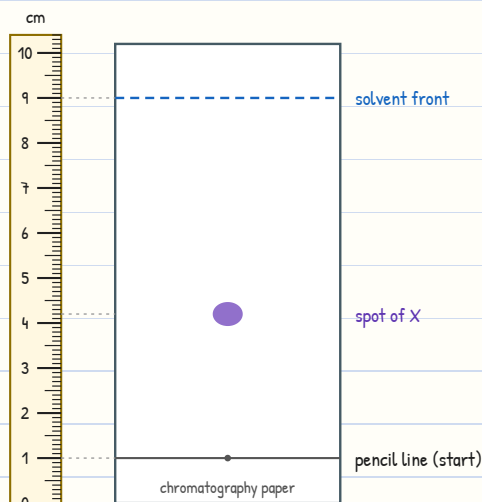
D propyl propanoate

38. A dicarboxylic acid reacts with a diol to form a polymer.

Which row is correct?

	<i>type of polymer</i>	<i>other product</i>
A	addition polymer	water
B	polyamide	water
C	polyester	none
D	polyester	water

39. The chromatogram of a colourless substance X, after locating, is shown beside a ruler marked in cm.



The table gives the R_f values of four substances in the same solvent.

<i>substance</i>	P	Q	R	S
R_f	0.25	0.40	0.47	0.80

Which substance could be X?

A P

B Q

C R

D S

40. Which row gives a suitable method to separate the mixture?

	<i>mixture</i>	<i>method</i>
A	sand and water	crystallisation
B	the dyes in a sample of ink	simple distillation
C	ethanol and water	fractional distillation
D	copper(II) sulfate from its aqueous solution	filtration

END OF PAPER 2

Paper 2 answer grid

Shade or circle one letter for each question. Then mark it with the key in the solutions section.

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

5 (A) (B) (C) (D)

6 (A) (B) (C) (D)

7 (A) (B) (C) (D)

8 (A) (B) (C) (D)

9 (A) (B) (C) (D)

10 (A) (B) (C) (D)

11 (A) (B) (C) (D)

12 (A) (B) (C) (D)

13 (A) (B) (C) (D)

14 (A) (B) (C) (D)

15 (A) (B) (C) (D)

16 (A) (B) (C) (D)

17 (A) (B) (C) (D)

18 (A) (B) (C) (D)

19 (A) (B) (C) (D)

20 (A) (B) (C) (D)

21 (A) (B) (C) (D)

22 (A) (B) (C) (D)

23 (A) (B) (C) (D)

24 (A) (B) (C) (D)

25 (A) (B) (C) (D)

26 (A) (B) (C) (D)

27 (A) (B) (C) (D)

28 (A) (B) (C) (D)

29 (A) (B) (C) (D)

30 (A) (B) (C) (D)

31 (A) (B) (C) (D)

32 (A) (B) (C) (D)

33 (A) (B) (C) (D)

34 (A) (B) (C) (D)

35 (A) (B) (C) (D)

36 (A) (B) (C) (D)

37 (A) (B) (C) (D)

38 (A) (B) (C) (D)

39 (A) (B) (C) (D)

40 (A) (B) (C) (D)

Score: / 40

Worked solutions and mark schemes

Mark your papers first, then read the explanations. Totals: Paper 2 = 40, Paper 4 = 80, Paper 6 = 40.

Paper 2 Multiple Choice: answer key

1 B	2 A	3 D	4 B	5 C	6 A	7 D	8 C	9 B	10 A
11 C	12 D	13 C	14 A	15 B	16 D	17 A	18 C	19 D	20 B
21 A	22 C	23 D	24 B	25 A	26 D	27 C	28 B	29 A	30 C
31 D	32 A	33 B	34 C	35 D	36 B	37 A	38 D	39 B	40 C

Key balance: A 10 · B 10 · C 10 · D 10. One mark for each correct answer.

Paper 2: worked solutions

1 **B**

The substance starts as a liquid, so the flat part of the cooling curve is the freezing point: liquid is turning into solid. The temperature stays constant because, as forces of attraction form between the particles, energy is given out; this balances the energy lost to the surroundings. C has the energy direction wrong (freezing gives out energy). A and D describe changes that start from the wrong state: a liquid that is cooling cannot boil, and there is no gas present.

2 **A**

At the same temperature, gases with a lower relative molecular mass diffuse faster. M_r : CO = 28, CO₂ = 44, SO₂ = 64, so the order (fastest first) is CO, CO₂, SO₂. B is the order slowest first. C and D do not follow M_r .

3 **D**

Chromium has proton number 24 (Periodic Table). Neutrons = 52 – 24 = 28. The 3+ ion has lost three electrons: 24 – 3 = 21 electrons. A adds electrons for a positive ion; C gives the nucleon number as the number of neutrons; B swaps protons and electrons.

4 **B**

$$A_r = \frac{24 \times 79.0 + 25 \times 10.0 + 26 \times 11.0}{100} = \frac{1896 + 250 + 286}{100} = 24.32, \text{ which is } 24.3 \text{ to one decimal place.}$$
C is the simple average of 24, 25 and 26, which ignores the abundances. A uses only the most abundant isotope; D only the heaviest.

5 **C**

A Group II metal loses two electrons to form X²⁺; a Group VII element gains one electron to form Y⁻. Two Y⁻ ions balance one X²⁺ ion, so the formula is XY₂, and a compound of a metal with a non-metal is ionic. A and D (X₂Y) have the charges the wrong way round.

6 **A**

In CH₄ carbon uses all four of its outer electrons in four C–H bonds and each H uses its single electron, so there are no non-bonding (lone) pairs. NH₃ has one lone pair on N, H₂O has two lone pairs on O, and HCl has three lone pairs on Cl.

7 D

A metal is a lattice of positive ions in a "sea" of delocalised electrons. When a force is applied, the layers of ions slide over each other, but the attraction to the delocalised electrons still holds them together, so the metal changes shape without breaking (malleable). C is true but explains electrical conductivity, not malleability. Metallic bonds are strong (B is wrong); A would make the metal fall apart.

8 C

Carbon: $2 \times 4 = 8$ C atoms, so $y = 8$. Oxygen on the right: $8 \times 2 + 10 \times 1 = 26$ O atoms = 13 O_2 , so $x = 13$. D counts 26 molecules of O_2 instead of 26 atoms. A forgets the 2 in front of C_4H_{10} : it gives $y = 4$ and then $4 \times 2 + 10 = 18$ O atoms = 9 O_2 . B mixes the two methods.

9 B

M_r of $\text{CO}(\text{NH}_2)_2 = 12 + 16 + 2 \times (14 + 2) = 60$. Mass of nitrogen = $2 \times 14 = 28$. % N = $28 \div 60 \times 100 = 46.7\%$. A uses only one nitrogen atom ($14 \div 60$); C treats the 28 as a percentage; D is the percentage of everything except nitrogen.

10 A

$M_r(\text{MgCO}_3) = 24 + 12 + 48 = 84$, so $21.0 \text{ g} = 0.250 \text{ mol}$. 1 mol MgCO_3 gives 1 mol MgO (M_r 40): $0.250 \times 40 = 10.0 \text{ g}$. C (11.0 g) is the mass of carbon dioxide given off; B uses $M_r = 100$ (the value for calcium carbonate); D assumes the mass does not change, but carbon dioxide escapes.

11 C

For gases at the same temperature and pressure, volume ratio = mole ratio. 1 mol C_3H_8 needs 5 mol O_2 , so 1.5 dm^3 needs $5 \times 1.5 = 7.5 \text{ dm}^3$. A assumes a 1 : 1 ratio; B uses the 3 : 1 ratio for carbon dioxide; D adds all the products (and water is a liquid at r.t.p.).

12 D

$n(\text{NaOH}) = 0.200 \times 25.0/1000 = 0.00500 \text{ mol}$. The equation gives 2 : 1, so $n(\text{H}_2\text{SO}_4) = 0.00250 \text{ mol}$. $V = 0.00250 \div 0.100 = 0.0250 \text{ dm}^3 = 25.0 \text{ cm}^3$. B ignores the 2 : 1 ratio; C uses it the wrong way round; A halves the volume of alkali without allowing for the different concentrations.

13 C

$\text{N} : \text{O} = 30.4/14 : 69.6/16 = 2.17 : 4.35 = 1 : 2$, so the empirical formula is NO_2 ($M_r = 46$). $92 \div 46 = 2$, so the molecular formula is N_2O_4 . A is the empirical formula, the trap; B and D do not have the 1 : 2 ratio.

14 A

Concentrated chloride solution: chloride ions are discharged at the anode as chlorine. At the cathode, hydrogen ions from the water are discharged as hydrogen (sodium is more reactive than hydrogen, so it is not formed in aqueous solution). Na^+ and OH^- ions remain: sodium hydroxide. B gives sodium, which reacts with water; C is the result for a very dilute solution; D swaps the electrodes.

15 B

The object to be plated is the cathode, where Ni^{2+} ions gain electrons and nickel metal is deposited. The anode is nickel, which dissolves and replaces the Ni^{2+} ions, and the electrolyte must contain Ni^{2+} ions. A has the electrodes swapped; C and D contain no nickel ions.