Chemistry Paper 1

Question number	Answer	Mark
1(a)	Mg	1

Question number	Answer	Mark
1b)	C	1

Question number	Answer	Mark
1(c)	O (accept 8)	1

Question number	Answer	Mark
1(d)	2/alkaline earth	1

Question number	Answer	Mark
1(e)	7/halogen	1

Question number	Answer	Mark
2(a)	B — Stop clock E — funnel	2

Question number	Answer	Mark
2(b)	C/pipette D/measuring cylinder (answers in either order)	2

Question number	Answer	Mark
2(c)	E/funnel	1

Question number	Answer	Mark
3(a)(i)	From top to bottom Proton Electron Neutron	3

Question number	Answer	Mark
3(a)(ii)	8	1

Question number	Answer	Mark
3(a)(iii)	Be/Beryllium	1

Question number	Answer	Mark
3(b)	• Same number of protons/atomic number • Different number of neutrons/mass number/nucleon number	2

Question number	Answer	Mark
4(a)	1 Oxygen 2 Water	2

Question number	Answer	Mark
4(b)	Iron oxide/rust	1

Question number	Answer	Mark
4(c)	1 mark for each, maximum 2 • Oil • grease/polish • paint • plastic • zinc • Accept chrome/chromium Reject copper/magnesium	2

Question number	Answer	Mark
5(a)	Iron tube diagram completed with 5 or fewer bubbles Magnesium diagram completed with 7 or more bubbles	2

Question number	Answer	Mark
5(b)	Zinc + hydrochloric acid → zinc chloride + hydrogen	1

Question number	Answer	Mark
5(c)	Copper/silver/gold/platinum	1

Question number	Answer	Mark
5(d)	1 mark for each, maximum 2, eg • Water/H_2O/steam • Oxygen/O_2/air • Metal salt (solutions) • Allow metal oxides Allow suitable alternatives	2

Question number	Answer	Mark
6(a)(i)	Shared pair of electrons	1

Question number	Answer	Mark
6(a)(ii)	H × H (accept two × or two ·)	1

Question number	Answer	Mark
6(b)	Test — lighted/lit splint Result — (squeaky) pop/explosion	2

Question number	Answer	Mark
6(c)	(manufacture of) ammonia/margarine/HCl	1

Question number	Answer	Mark
6(d)	Hydrogen + oxygen → water	1

Question number	Answer	Mark
6(e)(i)	Colourless White Blue	3

Question number	Answer	Mark
6(e)(ii)	Before — 27 After — 32.5	2

Question number	Answer	Mark
6(e)(iii)	5.5 (ecf)	1

Question number	Answer	Mark
6(e)(iv)	B	1

Question number	Answer	Mark
7(a)	Heat	1

Question number	Answer	Mark
7(b)(i)	Diffusion	1

Question number	Answer	Mark
7(b)(ii)	Ammonium chloride/NH_4Cl	1

Question number	Answer	Mark
7(b)(iii)	Ammonia faster/hydrogen chloride slower	1

Question number	Answer	Mark
7(b)(iv)	A: Red B: Blue	2

Question number	Answer	Mark
8(a)(i)	A and C	2

Question number	Answer	Mark
8(a)(ii)	Contains a (carbon to carbon) double/multiple bond/can undergo addition reactions	1

Question number	Answer	Mark
8(b)(i)	Orange/yellow (1) – colourless (1)	2

Question number	Answer	Mark
8(b)(ii)	Correct structure of 1,2 – dibromoethane	1

Question number	Answer	Mark
8(c)	Correct structures for two isomers of C_4H_8 But - 1 - ene, but – 2 - ene (cis + trans) Cyclobutane, cyclomethylpropane, methylpropene	2

Question number	Answer	Mark
9(a)	Anticlockwise from top: Haematite Molten iron Slag	3

Question number	Answer	Mark
9(b)(i)	$C + O_2 \rightarrow CO_2$, ignore state symbols	1

Question number	Answer	Mark
9(b)(ii)	Heats it up/raises temperature/exothermic	1

Question number	Answer	Mark
9(c)	$CaCO_3 \rightarrow CaO + CO_2$	1

Question number	Answer	Mark
9(d)	Loss of oxygen/Fe^{3+} gains electrons/Fe ions gains electrons/Fe (III) gains oxygen (reject — Fe gains electrons)	1

Question number	Answer	Mark
9(e)(i)	Aluminium too reactive/more reactive than carbon/accept Al very high in the reactivity series	1

Question number	Answer	Mark
9(e)(ii)	Any suitable use, eg airplanes PLUS Property must be related, eg low density eg Specified transport - low density (not light) Cooking foil/drink cans - easily moulded/malleable Power cables - good conductor of electricity Window frames/cars - does not corrode Credit any other suitable Answers	2

Question number	Answer	Mark
10(a)(i)	Any two from: Fizz/bubble Move/darts around Melts/forms a ball/ Gets smaller/disappears (reject dissolves)	2

Question number	Answer	Mark
10(a)(ii)	Sodium + water → sodium hydroxide + hydrogen (accept correct formulae equation)	1

Question number	Answer	Mark
10(b)(i)	Orange/yellow	1

Question number	Answer	Mark
10(b)(ii)	Flame test	1

Question number	Answer	Mark
10(c)	Blue/purple (solution made is) alkaline/(contains) hydroxide ions OH^{-}/not just 'alkali metal' pH 11→14 (any in range)	2

Question number	Answer	Mark
10(d)	• Electrons being transferred between oxygen and sodium (can be wrong way round) • Idea of sodium losing electron(s) and oxygen gaining electron(s) • Correct number of electrons involved (sodium lose 1, oxygen gain 2) (sharing = 0 marks)	3

Question number	Answer	Mark
11(a)(i)	All points plotted correctly (-1 per error) -2 marks Smooth curve — 1 mark	3

Question number	Answer	Mark
11(a)(ii)	Point at (46,65) circled	1

Question number	Answer	Mark
11(a)(iii)	Any one from: • Marble chips bigger/surface less • Acid too cool • Volume of acid too small • Mass of chips too small • Acid more dilute – or reason that could cause this	1

Question number	Answer	Mark
11(b)(i)	Read values from graph: 76±1 cq 45±1	2

Question number	Answer	Mark
11(b)(ii)	cq on (i): 0.013 0.022 min 2 significant figures	2

Question number	Answer	Mark
11(b)(iii)	(the higher the temperature the) faster (the reaction) cq on (ii)	1

Question number	Answer	Mark
11(b)(iv)	• Particles have more energy • Move faster/more have energy greater than activation energy • More collisions per second/more frequent collisions greater proportions of collisions are successful	3

Question number	Answer	Mark
11(c)	Any suitable way of cooling flask/contents, eg an ice bath Do not accept ideas based on doing the reaction somewhere else.	1

Question number	Answer	Mark
12(a)	Bitumen Gasoline Bitumen	3

Question number	Answer	Mark
12(b)	Cracking Heat/400-1000 °C/high temperature (reject boil) Steam/catalyst/(high) pressure/5-100 atm	3

Question number	Answer	Mark
12(c)(i)	$2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$ All formula correct (1 mark) Formula balances (1 mark)	2

Question number	Answer	Mark
12(c)(ii)	Toxic/poisonous/death/fatal (reject suffocate) Correct reference to blood or haemoglobin	2

Question number	Answer	Mark
13(a)	2.8.7	1

Question number	Answer	Mark
13(b)	7	1

Question number	Answer	Mark
13(c)	Brown/orange (to) colourless	2

Question number	Answer	Mark
13(d)(i)	Red/pink (hydrobromic acid formed/H^+ ions present	2

Question number	Answer	Mark
13(d)(ii)	Blue No acid formed/no reaction/no H^+ ions	2

Question number	Answer	Mark
14(a)(i)	(1 + 80 +) 81	1

Question number	Answer	Mark
14(a)(ii)	1.62 ÷ 81 = 0.02 (ALLOW ecf)	2

Question number	Answer	Mark
14(a)(iii)	0.02 ÷ 0.25 = 0.08 (ALLOW ecf)	2

Question number	Answer	Mark
14(a)(iv)	0.08 × 81 = 6.5/6.48 OR 1.62 × 4= 6.5/6.48 (ALLOW ecf)	2

Question number	Answer	Mark
14(b)(i)	$HBr + NaOH \rightarrow NaBr + H_2O$	1

Question number	Answer	Mark
14(b)(ii)	Any from: H^+ (ions) react with OH^- (ions) OH^- (ions) gain protons	1

Question number	Answer	Mark
14(c)(i)	0.02 × 0.2 = 0.004 (20 × 0.2 = 4 (=1 ecf)	2

Question number	Answer	Mark
14(c)(ii)	0.004 ÷ 0.1 OR 20 × (0.2 ÷ 0.1) = 0.04 dm^3 OR = 40 cm^3 Units needed ALLOW ecf	2