Question	Answer	Marks
1(a)(i)	C	**1**
1(a)(ii)	D	**1**
1(a)(iii)	E	**1**
1(a)(iv)	B	**1**
1(a)(v)	D	**1**
1(b)	number of electrons in Ca ion: = 18 (1) number of neutrons in V = 28 (1) number of protons in V = 23 **AND** number of protons in Ca ion = 20 (1)	**3**

Question	Answer	Marks
2(a)(i)	Cl^- / chloride	**1**
2(a)(ii)	NH_4^+ AND SO_4^{2-}	**1**
2(a)(iii)	24 (mg)	**1**
2(b)	flame test / description of flame test (1) (flame coloured) red (1)	**2**
2(c)	nitrogen (1) phosphorus (1)	**2**
	pH 4 circled	**1**

Question	Answer	Marks
2(e)	1 mark each for any 2 of: • calcium carbonate • calcium oxide • calcium hydroxide	**2**
2(f)(i)	arrangement: random (arrangement) / no fixed arrangement / no pattern / no fixed position (1) separation: far apart / far away (from each other) / distant (from each other) (1)	**2**
2(f)(ii)	1 mark each for any 3 of: • (HCl) molecules escape from solution • diffusion • molecules in (constant) movement / molecules collide / molecules travel • (movement of) molecules is random / haphazard / in every direction • molecules spread out / molecules mix • (molecules spread) from high(er) concentration to low(er) concentration • molecules hit the litmus paper / molecules	**3**

Question	Answer	Marks
3(a)(i)	boiling point of Rb: any values between 675 and 755 (°C) (inclusive of these values) (1) atomic radius of K: any values between 0.195 and 0.245 (nm) (inclusive of these values) (1)	**2**
3(a)(ii)	decreases (1)	**1**
3(a)(iii)	solid (1) 60 °C is below the melting point / the melting point is above 60 °C (1)	**2**
3(b)(i)	number of protons in the nucleus of an atom / number of positive charges in the nucleus of an atom	**1**
3(b)(ii)	any suitable, e.g. detecting leaks in pipes / measuring thickness of paper / energy production	**1**
3(c)(i)	2 (Fe) (1) 3 (NaOH) (1)	**2**

Question	Answer	Marks
3(c)(ii)	iron(III) oxide loses oxygen / it loses oxygen	**1**

Question	Answer	Marks
4(a)(i)	OH alcohol group circled	**1**
4(a)(ii)	$C_4H_6O_5$	**1**
4(b)	it has a C=C double bond	**1**
4(c)(i)	large molecules / long chain molecules / macromolecules (1) built up from (many) small units / made from monomers (1)	**2**
4(c)(ii)	poly(ethene)	**1**
4(d)	with Mg: fizzes / bubbles / effervescence (1) litmus: turns red / turns pink (1)	**2**
4(e)(i)	pH 13	**1**
4(e)(ii)	18 (cm^3)	**1**

Question	Answer	Marks
5(a)(i)	breakdown of substance / idea of one substance forming two or more substances (1) using heat / on heating (1)	**2**
5(a)(ii)	add (aqueous) sodium hydroxide (1) white precipitate / white solid (1) **OR** add (aqueous) ammonia (1) no precipitate / **very slight** white precipitate (1)	**2**
5(b)(i)	gas syringe / upturned measuring cylinder dipping into container (1) apparatus is workable and airtight (1)	**2**

Question	Answer	Marks
5(b)(ii)	lower concentration of acid: decreases (in rate) / reaction slower / lower rate / slows down (1) higher temperature: increases (in rate) / reaction faster / higher rate / speeds up (1)	**2**
5(c)(i)	compound containing hydrogen and carbon only / compound containing hydrogen and carbon and no other substance (2) if two marks not scored, 1 mark for: compound containing hydrogen and carbon / it contains hydrogen and carbon only	**2**
5(c)(ii)	alkane(s)	**1**
5(c)(iii)	1 mark each for any 2 of: • carbon monoxide • carbon • water	**2**

Question	Answer	Marks
6(a)	dip indicator paper in to water (and record the colour) (1) compare the colour with (universal indicator) colour chart match colour with colour chart (1)	**2**
6(b)(i)	nitrogen (1) oxygen (1)	**2**
6(b)(ii)	large(r) particles cannot get through (the small gaps in) the filter / large(r) particles get trapped in the filter / large(r) particles too big to get through (filter) (1) water passes through (1)	**2**
6(b)(iii)	to kill bacteria / to kill micro-organisms	**1**
6(c)	(from) blue (1) (to) pink (1)	**2**

Question	Answer	Marks
7(a)(i)	negative electrode: lead (1) positive electrode: bromine (1)	**2**
7(a)(ii)	platinum (1)	**1**
7(b)	1 shared pair of electrons AND no other electrons on either H atom (1)	**1**
8(a)	Q AND S (1) low melting points (1) poor conductor (of electricity) / does not conduct (electricity) (1)	**3**
8(b)	basic (oxide) AND **T** is a metal / metal oxides are basic	**1**
8(c)	has a complete outer (electron) shell / has a full outer (electron) shell	**1**
8(d)	1 mark each for any 2 of: • transition elements have a high(er) density / Group I has a low(er) density • transition elements form coloured compounds / Group I compounds are not coloured • transition elements form ions with different charges / Group I forms only one type of ion • transition elements are good catalysts / Group I elements not catalysts	**2**
8(e)	copper < nickel < iron < calcium (2) if 2 marks not scored, 1 mark for: 1 consecutive pair reversed / calcium < iron < nickel < copper	**2**
8(f)	⇌	**1**
8(g)	<u>mixture</u> of metal with another element	**1**