Mark Scheme

Q1.

Question Number	Answer	Mark
	The only correct answer is D (pale green – orange - purple) **A** *is not correct because chlorine is not orange and the colour stated for bromine is for the pure liquid state and solid iodine can appear black but not in an organic solvent* **B** *is not correct because solid iodine can appear black but not in an organic solvent* **C** *is not correct because chlorine is not orange and the colour stated for bromine is in the pure liquid state*	(1)

Q2.

Question number	Answer	Mark
	The only correct answer is D (grey/black solid, purple gas) ***A*** *is incorrect because iodine solid is not purple and iodine gas is not brown* ***B*** *is incorrect because iodine solid is not purple* ***C*** *is incorrect because iodine gas is not brown*	**(1)**

Q3.

Question number	Answer	Mark
	The only correct answer is C ($Cl_2(aq) + 2NaBr(aq) \rightarrow 2NaCl(aq) + Br_2(aq)$) ***A*** *is incorrect because bromine is less reactive than chlorine so no reaction occurs* ***B*** *is incorrect because bromine is less reactive than fluorine so no reaction occurs* ***D*** *is incorrect because chlorine is less reactive than fluorine so no reaction occurs*	**(1)**

Q4.

Question number	Answer	Mark
(i)	**The only correct answer is C** (graph C) ***A*** *is incorrect because HF has a much higher boiling temperature than expected due to hydrogen bonding* ***B*** *is incorrect because these is an increase in boiling temperature from HCl to HI as the number of electrons in the molecules increases so the London forces increase in strength* ***D*** *is incorrect because HBr has a higher boiling temperature than HCl as there are more electrons in the molecules*	**(1)**

Question number	Answer	Mark
(ii)	**The only correct answer is A** (acid-base) ***B*** *is incorrect there is no displacement taking place* ***C*** *is incorrect because neither substance is oxidised or reduced* ***D*** *is incorrect because there is no substitution taking place*	**(1)**

Q5.

Question Number	Answer	Mark
	The only correct answer is C (there is no change) **A** *is not correct because magnesium ions have no effect on flame colour* **B** *is not correct because the elemental magnesium and not the metal ions give a white colour* **D** *is not correct because magnesium ions have no effect on flame colour*	**(1)**

Q6.

Question Number	Answer	Mark
	The only correct answer is A (green) **B** *is not correct because this is the colour for potassium ions* **C** *is not correct because this is the colour for lithium, calcium and strontium ions* **D** *is not correct because this is the colour for sodium ions*	**(1)**

Q7.

Question Number	Answer	Mark
	The only correct answer is D (nichrome wire and concentrated hydrochloric acid) **A** *is not correct because iron wire is not used* **B** *is not correct because iron wire is not used* **C** *is not correct because concentrated hydrochloric acid and not water is needed*	(1)

Q8.

Question Number	Answer	Mark
(i)	The only correct answer is **D** (it reacts with the compounds to form volatile chlorides) *A is not correct because hydrochloric acid doesn't dissolve the metal* *B is not correct because there are no hydroxide ions present and they don't colour the flame* *C is not correct because hydrochloric acid doesn't reduce the metal ions*	(1)

Question Number	Answer	Mark
(ii)	The only correct answer is **C** (red) *A is not correct because ions giving green shades include barium ions* *B is not correct because ions giving lilac shades include potassium ions* *D is not correct because ions giving yellow shades include sodium ions*	(1)

Question Number	Answer	Mark
(iii)	The only correct answer is *C* (released due to different gaps between energy levels) *A is not correct because promoting electrons in a flame test uses heat energy* *B is not correct because promoting electrons does not release light* *D is not correct because electrons are promoted within the metal atoms energy levels not transferred to non-metal ions*	(1)

Q9.

Question Number	Answer	Mark
	The only correct answer is C (sodium iodide) **A** *is not correct because calcium in calcium chloride gives a 'brick red flame* **B** *is not correct because lithium in lithium carbonate gives a 'crimson red' flame* **D** *is not correct because strontium in strontium bromide gives a 'red' flame*	**(1)**

Q10.

Question Number	Answer	Mark
	The only correct answer is B (85 K) **A** *is not correct because the Tb trend would suggest approx. 160 K. Therefore 4 K is much too low for fluorine* **C** *is not correct because this figure is derived from the trend in Tm (not Tb), with F placed at the bottom of Group 7 (575 K is the melting temperature of astatine)* **D** *is not correct because although this figure is derived from the trend in Tb, F is placed at the bottom of Group 7 (610 K is the boiling temperature of astatine)*	**(1)**

Q11.

Question Number	Answer	Mark
	The only correct answer is D (Platinum) **A** *is not correct because copper will give a flame colour* **B** *is not correct because iron is insufficiently inert* **C** *is not correct because magnesium will burn with a white flame*	**(1)**

Q12.

Question Number	Answer	Mark
	D (white smoke)	**(1)**

Q13.

Question Number	Answer	Mark
	The only correct answer is C (magnesium sulfate) ***A*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2* ***B*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2* ***D*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2*	**(1)**

Q14.

Question Number	Answer	Mark
	The only correct answer is C ***A*** *is not correct because barium hydroxide is the most soluble group 2 hydroxide* ***B*** *is not correct because calcium is below magnesium in the Periodic Table so this is more soluble* ***D*** *is not correct because group 1 hydroxides are very soluble compared to group 2 hydroxides*	**(1)**

Q15.

Question Number	Answer	Mark
	The only correct answer is D ***A*** *is not correct because it is the 2nd most soluble* ***B*** *is not correct because it is the 3rd most soluble* ***C*** *is not correct because it is the least soluble*	**(1)**

Q16.

Question Number	Answer	Mark
	The only correct answer is B (solubility of sulfates decreases and solubility of hydroxides increases down group 2) **A** *is not correct because the solubility of Group 2 sulfates deceases down the group* **C** *is not correct because the solubility of Group 2 hydroxides increases down the group* **D** *is not correct because the solubility of Group 2 sulfates decreases down the group and the solubility of Group 2 hydroxides increases down the group*	**(1)**

Q17.

Question Number	Answer	Mark
	The only correct answer is B (hydroxides – increases, sulfates – decreases) *A is not correct because sulfate solubility does not increase down the group* *C is not correct because hydroxide solubility does not decrease down the group and sulfate solubility does not increase down the group* *D is not correct because hydroxide solubility does not decrease down the group*	**(1)**

Q18.

Question Number	Answer	Mark
	The only correct answer is A (carbonates – increases, nitrates – increases) *B is not correct because thermal stability of Group 2 nitrates does not decrease down the group* *C is not correct because thermal stability of Group 2 carbonates does not decrease down the group* *D is not correct because thermal stabilities of Group 2 carbonates and nitrates do not decrease down the group*	**(1)**