

Inorganic Chemistry of Group 7 - Mark Scheme


Q1.

Question number	Answer	Mark
	C bromine, hydrogen bromide and sulfur dioxide only	1

Q2.

Question number	Answer	Additional guidance	Mark
(a)	<ul style="list-style-type: none"> balanced equation (1) all states correct (1) 	$I_2(s) + Cl_2(g) \rightarrow 2ICl(l)$ Accept multiples	2

Question number	Answer	Additional guidance	Mark
(b)	<ul style="list-style-type: none"> correct electronegativity values and correct dipole diagram 	Cl = 3.0 and I = 2.5 $\delta^+ I - Cl \delta^-$ Do not award full charges	1

Question number	Answer	Additional guidance	Mark
(c)(i)	<ul style="list-style-type: none"> 1 mark each correct formula 	 <p>Allow 1 mark for 2 correct non-skeletal formulae</p>	2

Question number	Answer	Additional guidance	Mark
(c)(ii)	An explanation that makes reference to the following points: <ul style="list-style-type: none"> identification of correct isomer (1) iodine is δ^+ and is attacked by the π electrons (1) more stable secondary carbocation formed. (1) 	2-chloro-1-iodopropane	3

Question number	Answer	Additional guidance	Mark
(d)(i)	An answer that makes reference to the following points: <ul style="list-style-type: none"> carry out in fume cupboard (1) chlorine is toxic. (1) 	Allow fume hood or similar description Do not allow 'harmful'	2

Question number	Answer	Additional guidance	Mark
(d)(ii)	<ul style="list-style-type: none"> I in ICl = +1 I in ICl₃ = +3 	Both needed for the mark	1

Question number	Answer	Additional guidance	Mark
(d)(iii)	<ul style="list-style-type: none"> +5 and -1 to -1 (and -1) (1) not disproportionation because the chlorine has not undergone both oxidation and reduction (1) 		2

Question number	Answer	Additional guidance	Mark
(e)(i)	<ul style="list-style-type: none"> correct method (1) answer with units (1) 	Cl ₂ = 2 × 35.5 = 71 71 ÷ 24000 = 0.0029583 g cm ⁻³ = 3 g dm ⁻³	2

Question number	Answer	Additional guidance	Mark
(e)(ii)	An explanation that makes reference to the following points: <ul style="list-style-type: none"> chlorine (gas) is more dense than air (1) chlorine (gas) removed (from the equilibrium) (1) position of equilibrium moves to the LHS (more brown liquid/ICl). (1) 		3

Question number	Answer	Additional guidance	Mark
(f)	<ul style="list-style-type: none"> calculation of mols of iodine and fluorine (1) calculation of whole number ratio and formula (1) 	Mols of iodine = 0.64 ÷ 126.9 = 5.04 × 10 ⁻³ Mols of fluorine = (1.31-0.64) ÷ 19 = 3.53 × 10 ⁻² Ratio 1:7 therefore formula IF ₇	2

Q3.

Question number	Answer	Mark
	B -1 and +5	1

Q4.

Question number	Answer	Mark
	D dilute nitric acid followed by silver nitrate solution gives a white precipitate	1