Equilibria - Mark Scheme

Q1.

Question number	Answer	Mark
	C the forward and reverse reactions have both stopped	1

Q2.

Question number	Answer		Additional guidance	Mark
(a)	• balanced equation	(1)	$I_2(s) + Cl_2(g) \rightarrow 2ICl(l)$	2
	• all states correct	(1)	Accept multiples	

Question number	Answer	Additional guidance	Mark
(b)	• correct electronegativity values and correct dipole diagram	$Cl = 3.0$ **and** $I = 2.5$ $\delta+ I \longrightarrow Cl\ \delta-$ Do not award full charges	1

Question number	Answer	Additional guidance	Mark
(c)(i)	• 1 mark each correct formula	 Allow 1 mark for 2 correct non-skeletal formulae	2

Question number	Answer		Additional guidance	Mark
(c)(ii)	An explantion that makes reference to the following points:			3
	• identification of correct isomer	(1)	2-chloro-1-iodopropane	
	• iodine is δ+ and is attacked by the π electrons	(1)		
	• more stable secondary carbocation formed.	(1)		

Question number	Answer		Additional guidance	Mark
(d)(i)	An answer that makes reference to the following points:			2
	• carry out in fume cupboard	(1)	Allow fume hood or similar description	
	• chlorine is toxic.	(1)	Do not allow 'harmful'	

Question number	Answer	Additional guidance	Mark
(d)(ii)	• I in ICl $= +1$ I in ICl_3 $= +3$	Both needed for the mark	1

Question number	Answer		Additional guidance	Mark
(d)(iii)	• +5 **and** -1 to -1 (and -1)	(1)		2
	• not disproportionation because the chlorine has not undergone both oxidation and reduction	(1)		

Question number	Answer		Additional guidance	Mark
(e)(i)	• correct method	(1)	$Cl_2 = 2 \times 35.5 = 71$ $71 \div 24000$	2
	• answer with units	(1)	$= 0.0029583$ g cm^{-3} $= 3$ g dm^{-3}	

Question number	Answer		Additional guidance	Mark
(e)(ii)	An explanation that makes reference to the following points:			3
	• 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)		

Question number	Answer		Additional guidance	Mark
(f)	• calculation of mols of iodine and fluorine	(1)	Mols of iodine = $0.64 \div 126.9 = 5.04 \times 10^{-3}$ Mols of fluorine = $(1.31 - 0.64) \div 19 = 3.53 \times 10^{-2}$	2
	• calculation of whole number ratio and formula	(1)	Ratio 1:7 therefore formula IF_7	