

4 a i	brown/red-brown/brown-orange/red-orange (NOT orange) (1) liquid (1) mark separately	2
4 a ii	chlorine is more reactive because it displaces bromine/oxidises/takes electrons away from Br ⁻ <i>ora reason must be given</i>	1
4 a iii	Br ⁻ on left and Br/Br ₂ and e ⁻ on right (only) scores (1) Completely correct 2Br ⁻ → Br ₂ + 2e ⁻ (2) electrons may be subtracted from LHS IGNORE state symbols	2
4 a iv	oxidation (ecf from a iii) NOT redox	1
4 b	toxic (vapour)/ respiratory problems (1); corrosive/ dangerous to/blisters/damages skin (1)	2
4 c	Ag ⁺ (aq) + Br ⁻ (aq) → AgBr(s) formation of AgBr (or another formula) (1); completely correct (1) allow doubled state symbols, provided (aq) + (aq) →(s) (1)	3
4 d i	bromine is decolourised (1) NOT "clear"	1
4 d ii	<p>either BOTH partial charges OR arrow (1)</p> <p>(allow cyclic) (1)</p> <p>δ^+ on carbon (or ring) (1)</p>	4
4 e i	light (on its own or qualified "visible", "uv" "sun", "radiation")/h.v. (radiation)	1
4 e ii	homolytic	1
4 e iii	initiation	1
4 e iv	hydrogen bromide (accept hydrobromic acid and HBr) (1)	1
4 e v	bromoethane (1) ALLOW 1-bromoethane	1