

1(a)(i)	(halogens can) remove electron(s) (from a reactant)																
1(a)(ii)	$2Al + 3Cl_2 \rightarrow 2AlCl_3$																
1(a)(iii)	purple (gas) disappears																
1(b)(i)	M1 Br—Br is weaker (than Cl—Cl) AND Br atoms are larger M2 less (significant) overlap of orbitals (in Br-Br)																
1(b)(ii)	HCl is more thermally stable																
1(b)(iii)	M1 (enthalpy change / energy change) when one mole of a compound / substance is formed M2 from its (constituent) elements in their standard state(s)																
1(b)(iv)	M1 $(6 \times -92) - (2 \times -46) =$ M2 $-460 \text{ (kJ mol}^{-1}\text{)}$																
1(b)(v)	M1 (trigonal) pyramidal M2 three bonding pairs AND one lone pair (of electrons)																
1(c)(i)	<table><tr><td></td><td>NaCl</td><td>NaBr</td><td>NaI</td></tr><tr><td>with $Ag^+(aq)$</td><td>white precipitate</td><td>M1 cream / off-white ppt</td><td>M2 yellow ppt</td></tr><tr><td>with conc. H_2SO_4</td><td>acid – base</td><td>acid – base, then redox</td><td>acid – base, then redox</td></tr><tr><td>observations with conc. H_2SO_4</td><td>M3 steamy fumes OR fizzing</td><td>M4 brown liquid OR fizzing</td><td> • black solid • yellow solid • effervescence </td></tr></table>		NaCl	NaBr	NaI	with $Ag^+(aq)$	white precipitate	M1 cream / off-white ppt	M2 yellow ppt	with conc. H_2SO_4	acid – base	acid – base, then redox	acid – base, then redox	observations with conc. H_2SO_4	M3 steamy fumes OR fizzing	M4 brown liquid OR fizzing	• black solid • yellow solid • effervescence
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1(c)(ii)	M1 black solid = iodine / I_2 AND yellow solid = sulfur / S_8 M2 effervescence = hydrogen sulfide / $H_2S(g)$																
1(d)(i)	M1 $MgCl_2$ (is ionic and) has mobile ions M2 $SiCl_4$ is covalent AND no charge carriers OR (no ions and) no delocalised electrons OR no mobile / moving ions																
1(d)(ii)	M1 $MgCl_2$ pH = 7 M2 $SiCl_4$ pH 0 – 4																