OCR (A) Chemistry A-Level - Haloalkanes

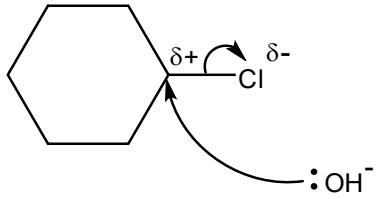
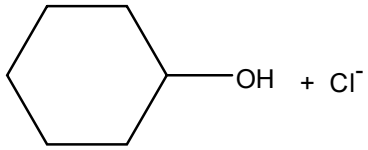
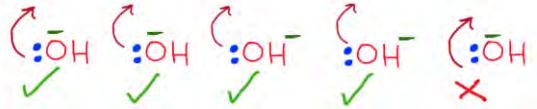
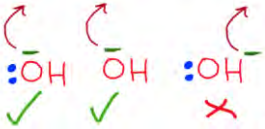
Mark Scheme

Question	Key	Marks	Guidance
1	B	1	
2	C	1	
3	D	1	

Mark Scheme

Question			Answer	Marks	Guidance
4	(a)		Links rate of reaction to strength of bond/bond enthalpy ✓ e.g. the weaker the bond the faster the reaction stronger bond takes longer to break lower bond enthalpy reacts faster	2	**Each marking point must be a comparison** **IGNORE** references to halogens as elements: *i.e.* chlorine is less reactive than bromine etc.
			Correct comparison of rate of reaction for at least **two** C–Hal bonds e.g. C–F bond is hydrolysed slow**est** C–I bond is hydrolysed faster than C–Br C–Br has shorter reaction time than C–Cl **OR** Correct comparison of C–Hal bond strength/enthalpy of at least **two** of C–Hal bonds e.g. C–I bond is the weak**est** C–I has lower bond enthalpy than C–Br C–Br is broken more easily/readily than C–Cl C–Hal bond strength decreases down group (7) ✓		**DO NOT ALLOW** chloride, bromide and iodide **IGNORE** references to bond length, polarity and electronegativity

Mark Scheme

Question	Answer	Marks	Guidance
(b)	Curly arrow from HO^- to carbon atom of C−Cl bond ✓ Dipole shown on C–Cl bond, $C^{\delta+}$ and $Cl^{\delta-}$ **AND** curly arrow from C−Cl bond to Cl atom ✓  **IGNORE** presence of Na^+ but OH^- needed i.e. Na^+OH^-can be allowed if criteria met --- Correct organic product **AND** Cl^- ✓  **IGNORE** presence of Na^+ but Cl^- needed i.e. Na^+Cl^-can be allowed **BUT** NaCl does **NOT** show Cl^-	3	**ANNOTATE ANSWER TICKS AND CROSSES** **NOTE**: curly arrows can be straight, snake-like, etc. but **NOT** double headed or half headed arrows **1st curly arrow** must • go to the C of C−Cl **AND** • start from, **OR** be traced back to **any point across width** of lone pair on O of OH^-  • **OR** start from – charge **on O** of ^-OH ion  *(Lone pair **NOT** needed if curly arrow shown from O^-)* **2nd curly arrow** must start from, **OR** be traced back to, **any part of** C–Cl bond and go to Cl 

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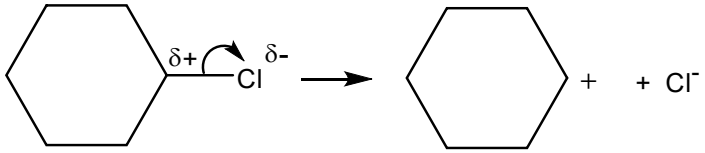
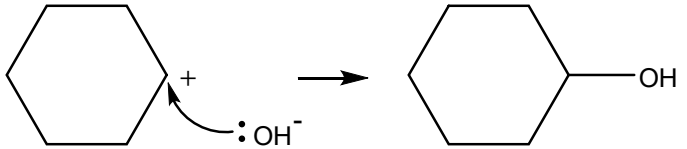
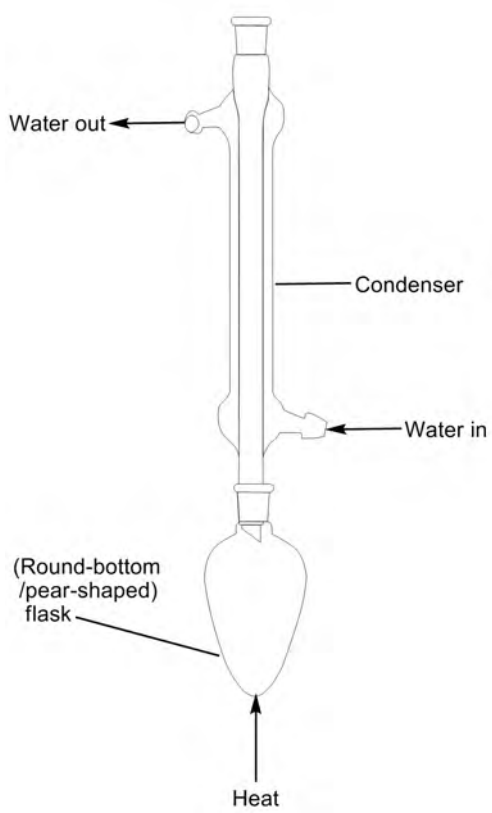
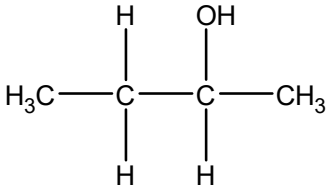
Question	Answer	Marks	Guidance
			--- **ALLOW** S_N1 mechanism **First mark** Dipole shown on C–Cl bond, $C^{\delta+}$ and $Cl^{\delta-}$, **AND** curly arrow from C−Cl bond to Cl atom ✓  **Second mark** Correct carbocation **AND** curly arrow from HO^- to carbocation  Curly arrow must come from lone pair on O of HO^- **OR** OH^- **OR** from minus on O of HO^- ion (no need to show lone pair if curly came from negative charge) ✓ **Third mark** Correct organic product **AND** Cl^- ✓ ---

Mark Scheme

Question			Answer	Marks	Guidance
	(c)	(i)	**Diagram** Diagram showing round bottom/pear shaped flask **AND** upright condenser ✓  **Labels** (Round-bottom/pear-shaped) flask **AND** condenser **AND** water in at bottom and out at top **AND** heat (source) ✓	**2**	**DO NOT ALLOW** conical flask, volumetric flask, beaker in place of round bottom/pear shaped flask **DO NOT ALLOW** distillation **DO NOT ALLOW** stopper/bung on top of condenser **IGNORE** a thermometer in condenser **IGNORE** a small gap between flask and condenser **ALLOW** diagram of heating apparatus as an alternative to heat label

Mark Scheme

Question			Answer	Marks	Guidance
	(c)	(ii)	**Precipitate G** **1 mark** silver bromide/AgBr **AND** M = 1.88/0.01 = 188 (g mol^{-1}) 188 – 107.9 = 80.1 (so halide is Br^-)✓ **Alcohol F and Haloalkane E** **2 marks** **E** and **F** clearly identified **F/alcohol:** butan-2-ol  **E/haloalkane:** E is haloalkane of C_4H_9X with • same halogen as **G** **AND** • same carbon chain as **F** ✓	**3**	**ALLOW** any combination of skeletal **OR** structural **OR** displayed formula as long as unambiguous **Note:** working is **required** for first mark **ALLOW** use of 108 as A_r of Ag **Note: E** and **F** can be identified by correct name or structure **BUT IGNORE** incorrect names
			Total	**10**	

Mark Schemes

Question	Answer	Marks	AO element	Guidance
5	**A**	**1**	AO2.2	
6	**D**	**1**	AO2.1	
7	**A**	**1**	AO2.5	