

Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Halogenoalkanes

Name of the Student: _____

Max. Marks : 23 Marks

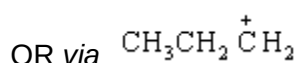
Time : 23 Minutes

Mark Schemes

Q1.

- (a) (i) Electrophilic addition
(Both words required) 1

- (ii) M1 the reaction to form 1-bromopropane goes via the primary carbocation OR 1° carbocation



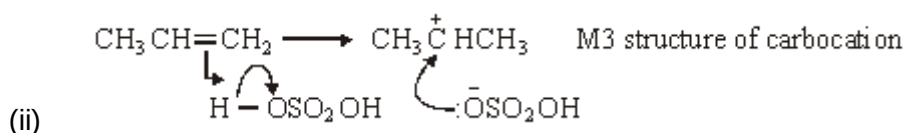
M2 primary carbocations are less stable than secondary carbocations
(Credit converse arguments for M1 and M2 i.e. the reaction to form 2-bromopropane goes via the secondary carbocation, M1, and secondary carbocations are more stable than primary carbocations, M2)
(Accept the use of "carbonium ions" as an alternative to carbocation) 1

- (b) M1 NaOH OR KOH OR correct name 1

M2 aqueous or solution in water *(ignore heat, reflux etc.)*
(Penalise M1 for hydroxide ion alone, but mark on and credit M2)
(Credit M2 ONLY for H_2O as reagent and heat / warm / $T=50$ to 100°C)
(NaOH(aq) scores M1 and M2 provided it is not contradicted)
(Penalise M2 if NaOH(aq) followed by concentrated or ethanol)
(Penalise M1 and M2 if followed by acid) 1

- (c) Ethanolic OR alcoholic OR $\text{CH}_3\text{CH}_2\text{OH}$ / CH_3OH solvent OR aqueous ethanol/alcohol
OR higher temperature *(must be comparative)*
(Ignore heat or heat under reflux)
(Credit part (c) independently from part (b))
(Penalise "ethanoic") 1

- (d) (i) Secondary OR 2° 1



M1 arrow from double bond to H of H – O bond

M2 arrow from bond to oxygen atom to show H – O bond breakage

M4 arrow from lone pair of electrons to carbon atom of carbocation

(Penalise M1 if arrow goes to H₂SO₄ or to formal positive charge on H, but ignore partial charges on sulphuric acid unless wrong)

(Credit M2 for H⁺ ion)

(For M4, accept negative charge anywhere on the ion)

4

(iii) Catalyst ONLY

(Ignore homogeneous, heterogeneous)

1

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Q2.

- (a) (i) (Free) radical substitution
(Both words needed) 1

- (ii) M1 initiation ONLY 1

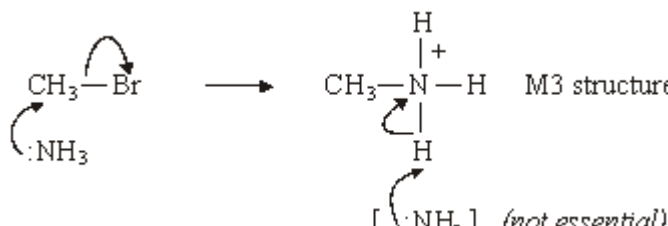
M2 ultra-violet light OR sunlight OR $1000^{\circ}\text{C} \geq T \geq 450^{\circ}\text{C}$
(Ignore reference to temperature if included with uv light)
(Penalise "high temperature" for M2) 1

- (iii) $2\dot{\text{C}}\text{H}_3 \rightarrow \text{C}_2\text{H}_6$
(OR CH_3CH_3 as alternative to C_2H_6) 1

- (iv) $\text{CH}_3\text{Br} + \text{Br}_2 \rightarrow \text{CH}_2\text{Br}_2 + \text{HBr}$ 1

- (b) (i) Electron pair donor
OR species with an electron pair able to form a covalent bond. 1

- (ii) Methylamine
(Credit "aminomethane") 1

- (iii)  1

M1 arrow to show breakage of C – Br bond 1

M2 arrow from lone pair on N of NH_3 to form bond with C 1

M4 arrow from bond of N – H to N atom of CH_3NH_3^+
(Ignore partial charges on haloalkane but penalise if incorrect)
(Accept CH_3NH_3^+ for M3)
(Full credit for carbocation mechanism; M1 for C – Br bond breakage
and M2 for lone pair attack on carbocation)
(Second mole of ammonia not essential to mechanism for full credit) 1

[11]