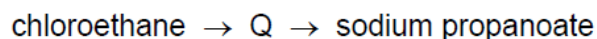


Halogen derivatives – 2016

1. 9701/11/O/N/16/24

Chloroethane can be used to make sodium propanoate.



The intermediate, Q, is hydrolysed with boiling aqueous sodium hydroxide to give sodium propanoate.

Which reagent would produce the intermediate, Q, from chloroethane?

- A concentrated ammonia solution
- B dilute sulfuric acid
- C hydrogen cyanide in water
- D potassium cyanide in ethanol

2. 9701/11/O/N/16/38

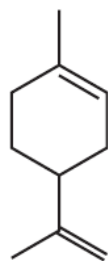
Bromoethane reacts with NaOH in different ways depending on the solvent used.

Which statements about these reactions are correct?

	solvent used	main organic product
1	water	ethane-1,2-diol
2	ethanol	ethene
3	water	ethanol

3. 9701/12/O/N/16/20

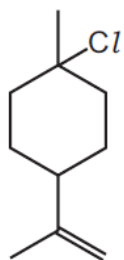
Limonene is found in lemon and orange oils.



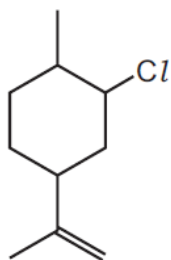
limonene

What will be the major product when limonene is reacted with an excess of dry hydrogen chloride?

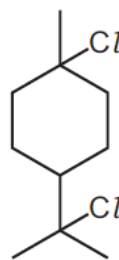
A



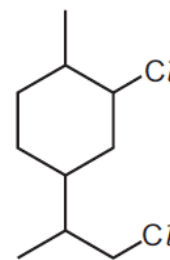
B



C



D



4. 9701/12/O/N/16/22

The reaction $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} + \text{OH}^- \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} + \text{Br}^-$ proceeds via an $\text{S}_{\text{N}}2$ mechanism.

The reaction $(\text{CH}_3)_3\text{CBr} + \text{OH}^- \rightarrow (\text{CH}_3)_3\text{COH} + \text{Br}^-$ proceeds via an $\text{S}_{\text{N}}1$ mechanism.

Which statement about these two reactions is correct?

- A** Both reactions involve homolytic bond fission.
- B** Both reactions involve hydroxide ions acting as electron pair donors.
- C** Both reactions involve the formation of a positively-charged intermediate.
- D** Both reactions occur in a single step.

5. 9701/12/O/N/16/38

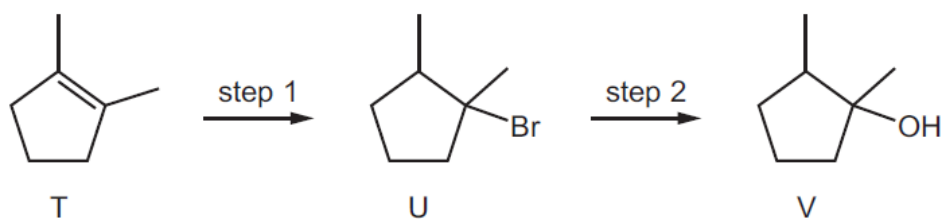
1-bromopropane reacts with NaOH in different ways depending on the solvent used.

Which statements about this reaction are correct?

	solvent used	main organic product
1	ethanol	propene
2	water	propan-1-ol
3	ethanol	propane-1-2-diol

6. 9701/12/F/M/16/24

Hydrogen bromide can be added to T to give compound U. Compound U can be hydrolysed to compound V.



Four students, W, X, Y and Z, made the following statements.

- W All the atoms in a molecule of compound T lie in the same plane.
- X Compound V contains only one chiral centre.
- Y Step 1 is an electrophilic addition reaction.
- Z Step 2 is a nucleophilic substitution reaction.

Which two students are correct?

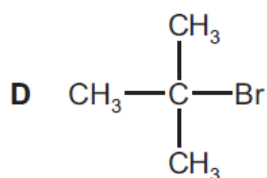
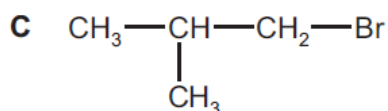
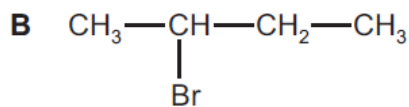
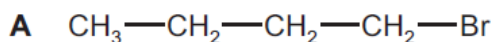
- A** W and Y **B** W and Z **C** X and Y **D** Y and Z

7. 9701/12/F/M/16/25

Structural isomerism and stereoisomerism should be considered in answering this question.

Compound J is reacted with KOH dissolved in ethanol. Three isomeric alkenes with molecular formula C_4H_8 are formed.

What is J?



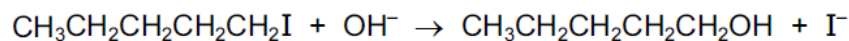
8. 9701/12/F/M/16/29

Which statement about poly(chloroethene) is correct?

- A The polymer can be cracked to produce chlorinated alkenes.
- B The polymer has harmless combustion products.
- C The polymer is readily biodegradable when buried.
- D The repeat unit of the polymer has an M_r of 97.

9. 9701/11/M/J/16/25

A student prepares pentan-1-ol by the alkaline hydrolysis of 1-iodopentane. She gently warms the reaction mixture for 20 minutes.



When the student uses 1-chloropentane to prepare the same alcohol she has to change the condition of the reaction.

Which change in condition should she use and what is the correct reason for its use?

	change in condition	reason
A	heat under reflux	C–Cl bond is more polar than the C–I bond
B	heat under reflux	C–Cl bond is stronger than the C–I bond
C	room temperature	C–Cl bond is more polar than the C–I bond
D	room temperature	C–Cl bond is shorter than the C–I bond

10. 9701/11/M/J/16/36

Which types of reaction can occur with 1-bromobutane?

- 1 elimination
- 2 hydrolysis
- 3 free radical substitution

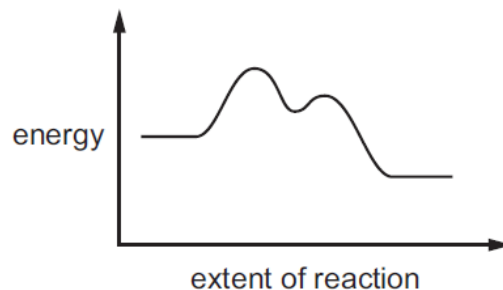
11. 9701/13/M/J/16/28

Which reaction will give 2-chloropropane in the best yield?

- A** propane gas with chlorine gas in the presence of ultraviolet light
- B** propan-2-ol with dilute NaCl(aq)
- C** propan-2-ol with $\text{SOCl}_2(\text{l})$
- D** propene with dilute HCl(aq)

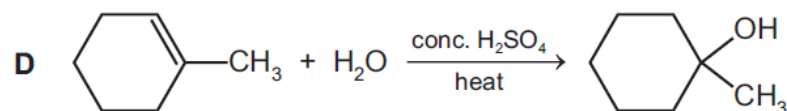
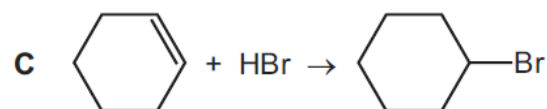
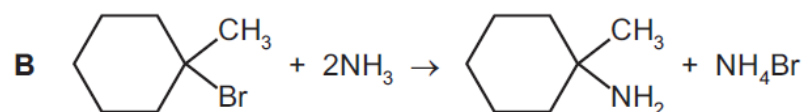
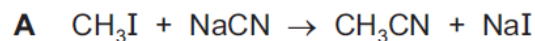
12. 9701/13/M/J/16/25

A reaction pathway diagram is shown.



The four reactions that follow are all exothermic.

Which reaction would **not** have such a pathway?



13. 9701/13/M/J/16/37

Halogenoalkanes show trends in their physical and chemical properties.

Which properties steadily increase from $\text{C}_2\text{H}_5\text{Cl}$ to $\text{C}_2\text{H}_5\text{Br}$ to $\text{C}_2\text{H}_5\text{I}$?

- 1 the polarity of the carbon-halogen bond
- 2 the boiling point of the halogenoalkane
- 3 the rate of reaction of the halogenoalkane with nucleophiles