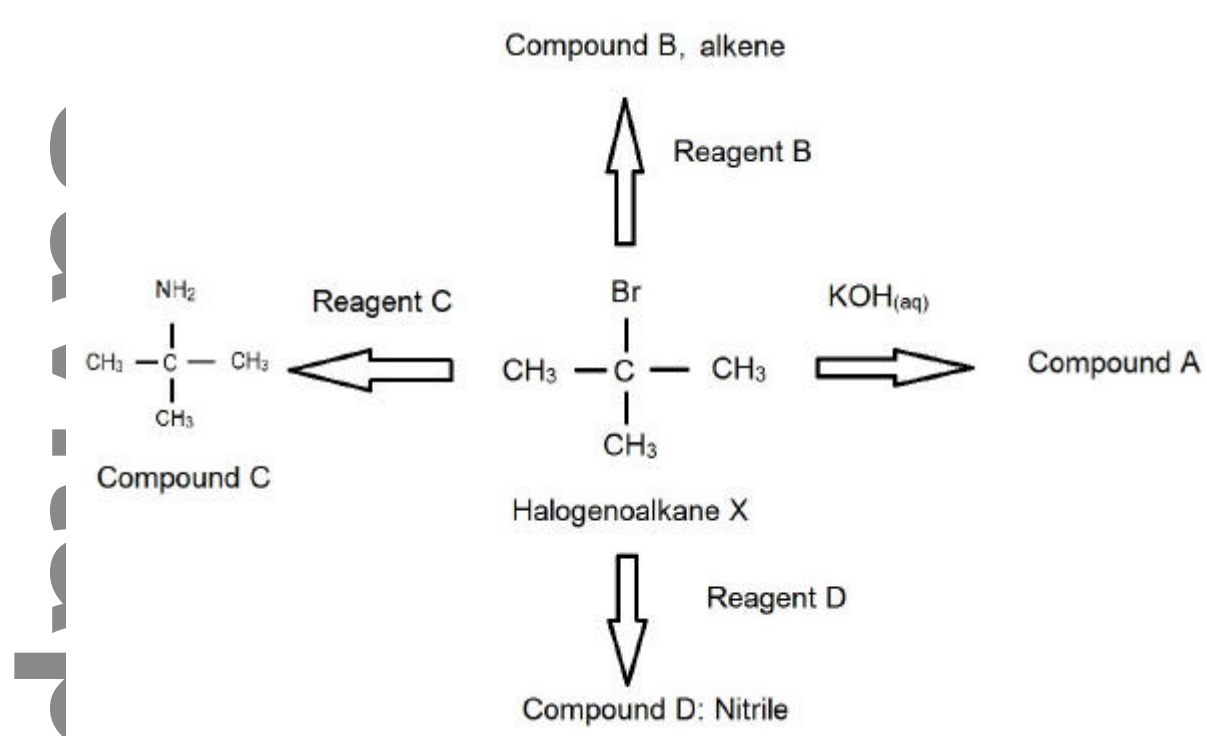


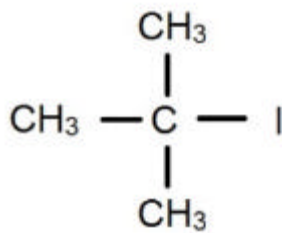
**Halogenoalkane Questions**

1. Some reactions of halogenoalkanes are shown in the diagram below:



- Name halogenoalkane x
- Draw a structural formula of compound A and state its name.
  - The reaction to form compound A is called nucleophilic substitution. Explain what is meant by the term "nucleophilic"?
  - Using curly arrows, show the mechanism by which compound A is formed from the halogenoalkane x.
- What substance(s) would make up reagent B?
  - Give the structural formula and the name of compound B.
  - Name the type of reaction by which compound B is formed.
- What substance(s) would be used to make reagent C?
  - State the conditions needed for the reaction to occur.
  - Name the functional group in compound C.
  - Name the compound C.
- What substance(s) would be used to make the reagent D?
  - Give the structural formula and name of compound D.

- c. Explain why the reaction of the halogenoalkane X with the reagent D to form compound D is a very useful reaction.
- d. Oxidation of compound D forms a product E. State the condition(s) for the oxidation of reagent D to yield the product E and give the structural formula and the name of the compound E.
- e. State the condition required for the reduction of compound E to form compound F. Give the structural formula and the name of the reagent used to form compound F by the reduction of reagent D.
- f)
- A student treats a few drops of halogenoalkane X with a few drops of silver nitrate solution. Name the precipitate that is formed and state its colour.
  - The student repeats the experiment with the halogenoalkane shown below: The formation of the precipitate is faster. The student states that the C – I bond is less polar than the C – Br bond and is surprised by the result. What is the explanation for the difference in rates?



- The student repeats the experiment with another bromoalkane, which is an isomer of halogenoalkane X. The reaction goes much more slowly than with X. Suggest the formula of the isomer used.
- 2. Determine what reagents are required for the synthesis in one step of the following products:**
- Aminopropane
  - 2-methylpropanitrile
  - Hexan-1-ol (2 routes)
  - Hex-1-ene (2 routes)

**3. 1-iodoethane reacts with NaOH**

- Explain the mechanism of this reaction using curly arrows to represent the movement of electron pairs and show any stereochemical features of the reaction mechanism.
- State the rate expression for this reaction and identify the molecularity of the RDS.
- Suggest why polar aprotic solvents are more suitable for SN2 reactions whereas polar protic solvents favor SN1 reactions.
- Deduce with a reason if water or DMF is a better solvent for this reaction.