

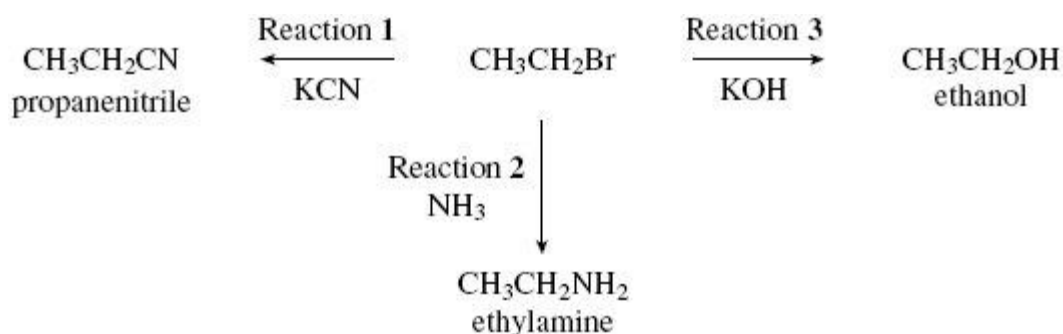
Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

Nucleophiles react with bromoethane in substitution reactions. This type of reaction is illustrated in the following scheme.



- (a) State what is meant by the term *nucleophile*.

(1)

- (b) Outline a mechanism for the reaction of potassium cyanide with bromoethane (Reaction 1).

(2)

- (c) Explain why an excess of ammonia is needed in Reaction 2 to produce a high yield of ethylamine.

(1)

- (d) When potassium hydroxide reacts with bromoethane, ethene can also be formed. Name and outline a mechanism for this reaction.

Name of mechanism _____

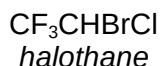
Mechanism

(4)

(Total 8 marks)

Q2.

One of the first substances used as an anaesthetic in medicine was chloroform (trichloromethane, CHCl_3). By 1950, *halothane* was in common use but by 1990 this had been replaced by more acceptable anaesthetics such as *desflurane*.



One reason for replacing *halothane* was that it is an organic compound that contains chlorine. Chlorine-containing organic compounds are thought to cause damage to the ozone layer in the upper atmosphere.

- (a) Name and outline a mechanism for the reaction of chlorine with methane to form chloromethane (CH_3Cl).

Write an overall equation for the reaction of chlorine with methane to form trichloromethane (CHCl_3).

(5)

- (b) Explain how chlorine atoms are formed from chlorine-containing organic compounds in the upper atmosphere.

Explain, with the aid of equations, how chlorine atoms act as a catalyst in the decomposition of ozone into oxygen.

(6)

- (c) Use the formulae of the two anaesthetics, *halothane* and *desflurane*, to help to explain why *desflurane* is considered to be a more **environmentally** acceptable anaesthetic than *halothane*.

(2)

(Total 13 marks)