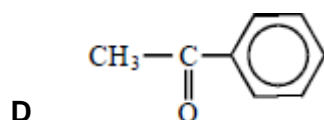
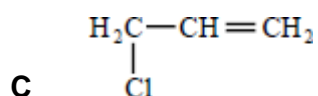
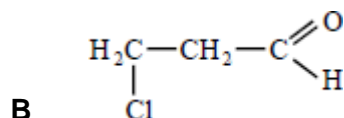
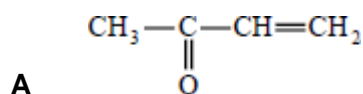


- Q1.** (a) Outline a mechanism for the formation of ethylamine from bromoethane. State why the ethylamine formed is contaminated with other amines. Suggest how the reaction conditions could be modified to minimise this contamination. (6)
- (b) Suggest one reason why phenylamine cannot be prepared from bromobenzene in a similar way. Outline a synthesis of phenylamine from benzene. In your answer you should give reagents and conditions for each step, but equations and mechanisms are not required. (5)
- (Total 11 marks)**

Q2. Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?



(Total 1 mark)

- Q3.** (a) The reaction between aqueous persulphate ions, $\text{S}_2\text{O}_8^{2-}(\text{aq})$, and iodide ions, $\text{I}^-(\text{aq})$, is catalysed by $\text{Fe}^{2+}(\text{aq})$ ions. Suggest why this reaction has a high activation energy. Write equations to explain the catalytic action of $\text{Fe}^{2+}(\text{aq})$ ions. Suggest why $\text{V}^{3+}(\text{aq})$ ions will also act as a catalyst for this reaction but $\text{Mg}^{2+}(\text{aq})$ ions

will not.

(6)

- (b) Outline a mechanism for the reaction between benzene and ethanoyl chloride and explain why AlCl_3 acts as a Lewis acid catalyst for this reaction. Predict, with an explanation in each case, the suitability of FeCl_3 and of NH_4Cl to act as a catalyst for this reaction.

(9)

(Total 15 marks)