4.7 Exercise 1 – amines

1. a)

   Write an equation for the reaction of chloroethane with excess ammonia to form aminoethane and give a mechanism for the reaction.

   b)

   If excess ammonia is not used, a variety of other organic products are formed. Write equations to show the formation of three other organic products.

   c)

   Aminoethane can also be prepared by a reduction reaction. Identify a starting compound that can be used to prepare aminoethane by reduction, give the necessary reagent and write an equation for the reaction.

   d)

   Suggest, with a reason, which of the methods used in a) and c) is likely to result in a higher yield of aminoethane.

2. Write equations for the following reactions, showing clearly the structure of the organic product:
   a) bromomethane with excess ammonia
   b) chloroethane with ammonia (1:1 ratio)
   c) bromomethane with aminoethane (1:1 ratio)
   d) 2-chloropropane with N-methylaminoethane (1:1 ratio)
   e) bromoethane with N,N-diethylaminoethane (1:1 ratio)
   f) chloromethane with ammonia (3:1 ratio)
   g) propanenitrile with $LiAlH_4$.

3. a) Draw the structure of tetradecylammonium chloride.
   b) What type of compound is this this?
   c) Suggest a use for this compound.

4. a) Write equations for the following reactions:
      i) ammonia with water
      ii) aminoethane with water
   b) Suggest, with a reason, which of the solutions in a) will have a higher pH.
   c) Write equations for the following reactions:
      i) aminoethane with HCl
      ii) N-methylaminomethane with sulphuric acid
      iii) N,N-dimethylaminoethane with HCl