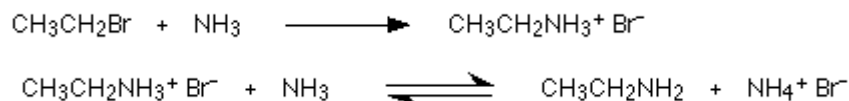


## Chemguide – questions

### AMINES: PREPARATION

1. a) To make a primary amine like ethylamine you can react a halogenoalkane like bromoethane with ammonia. State the conditions for this reaction.
- b) The equations for the reaction (taken from the Chemguide page to save me time) are



Describe in words what is happening in these two equations.

- c) Unfortunately the reaction doesn't stop there, and you end up with a mixture of several organic products rather than the two (the amine salt and the free amine) shown above. By writing equations like the ones in part (b), show what happens to make the next lot of products from those in the reactions above.
- d) The reaction wouldn't stop there either. There are three further organic products that you could get. Draw their structures.
- e) What would your major product be if you had a large excess of bromoethane in the original reaction mixture?
- f) What would your major product be if you had a large excess of ammonia in the original reaction mixture?
2. Primary amines can be made from nitriles avoiding the complicated mixtures formed above. The reaction can be done with either lithium tetrahydridoaluminate (lithium aluminium hydride), or hydrogen in the presence of a metal catalyst.
- a) Give the conditions for the reaction involving  $\text{LiAlH}_4$ .
- b) This reaction is a reduction, and the equation is commonly given using the symbol  $[\text{H}]$  for the reducing agent. Write the equation for the reduction of  $\text{CH}_3\text{CH}_2\text{CN}$  using  $\text{LiAlH}_4$ .
- c) Suggest a suitable catalyst for the reduction of  $\text{CH}_3\text{CH}_2\text{CN}$  with hydrogen gas.
- d) Write the equation for that reduction.