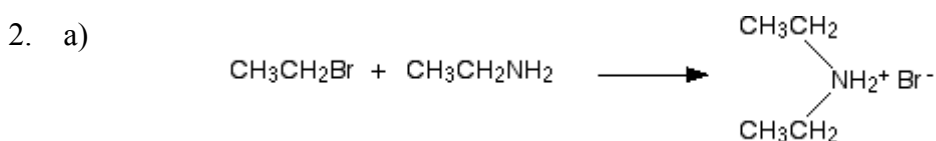## AMINES: AS NUCLEOPHILES

1. a) A nucleophile is something which is attracted to, and then attacks, a positive or slightly positive part of another molecule or ion.
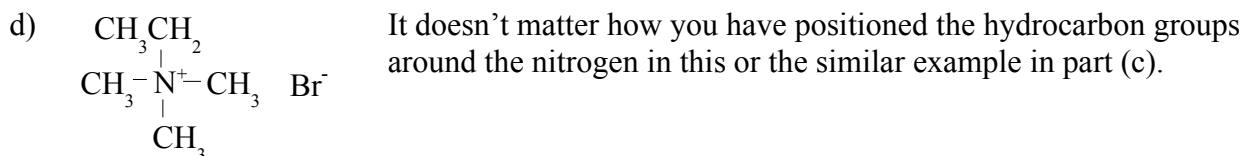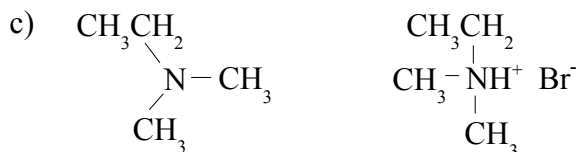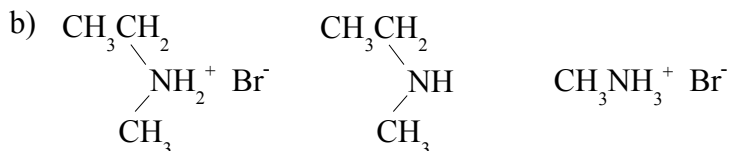
   b) The lone pair on the very electronegative nitrogen atom is attracted to anything with some positive charge on it.

2. a)

$$CH_3CH_2Br + CH_3CH_2NH_2 \longrightarrow$$

In the first reaction, the bromine is pushed off the ethyl group as a bromide ion, and is replaced by the whole of the amine to form an ammonium-like ion. The product is diethylammonium bromide.
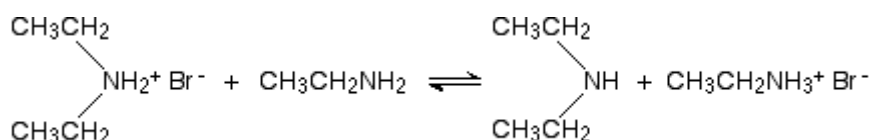
In the second reaction, an equilibrium is set up involving a reaction between another ethylamine molecule which removes a hydrogen ion from the diethylammonium ion and forms the free diethylamine. In the process, ethylammonium bromide is formed. A similar reaction can happen between the two compounds on the right-hand side of the equation, reversing the reaction.

b)

c)

d)

It doesn't matter how you have positioned the hydrocarbon groups around the nitrogen in this or the similar example in part (c).

If you got these last three parts right, very well done! Having two different hydrocarbon groups involved makes the whole process seem much more difficult than it already is.

Chemguide – answers

3. a) You would get a violent reaction in the cold producing a white solid

   b) N-ethylethanamide, $CH_3CONHCH_2CH_3$ and ethylammonium chloride, $CH_3CH_2NH_3Cl$. You could show the ionic nature of the ethylammonium chloride, $CH_3CH_2NH_3^+ \ Cl^-$, if you want to.

   (This is another question where you have to understand what you are doing rather than just learning the example on the Chemguide page.)

4. N-methylethanamide, $CH_3CONHCH_3$ and methylammonium ethanoate, $CH_3COO^- \ ^+NH_3CH_3$. You could draw this without showing the ionic nature of the compound, but it is probably better to write it like this.

   (The only way of knowing for sure which way you should write these formulae in an exam is to look at mark schemes for past exam papers, and copy what your examiners do. You could also see if you can find similar formulae in exam papers as well.)