HALOGENOALKANES: REACTIONS WITH CYANIDE IONS

1. a) Heat the bromoethane under reflux with a solution of sodium or potassium cyanide in ethanol.

b) $CH_3CH_2Br + CN^- \longrightarrow CH_3CH_2CN + Br^-$

(The negative charge doesn't show up very well on the bromine in this font, but it *is* there!)

c) propanenitrile

d) Sodium or potassium cyanide solutions in water are both fairly alkaline, containing hydroxide ions from an interaction between the cyanide ions and the water. If you do the reaction in solution in water, you tend to get substitution by hydroxide.

e) (i) $CH_3\underset{\displaystyle CN}{\underset{|}{C}}HCH_3$ $\qquad$ $CH_3\underset{\displaystyle CH_3}{\underset{|}{C}}HCN$

(These are the same molecule, but drawn differently. If you are just starting organic chemistry, you wouldn't necessarily see them as being the same. Either is acceptable.)

(ii) $CH_3\underset{\displaystyle CN}{\underset{|}{C}}HCH_3$ $\qquad$ $CH_3\underset{\displaystyle CH_3}{\underset{|}{C}}HCN$

(I am offering two versions of this one as well for the same reason. Which one you draw will depend on how you drew your original halogenoalkane.)

f) It forms a new carbon-carbon bond, and so is a way of lengthening a carbon chain.