

1. Aqueous hydroxide ions act as nucleophiles and attack carbon atoms which have halogens attached. An example of this is the reaction between aqueous sodium hydroxide and 2 chloropropane.

- (a) What is a nucleophile? Explain why hydroxide ions can act as nucleophiles.
 (b) Explain why a carbon atom attached to a halogen is susceptible to nucleophilic attack.
 (c) What are the products of the reaction between aqueous sodium hydroxide and 2 chloropropane.

2. Name the following ethers:

- (a) CH_3OCH_3 (b) $\text{C}_2\text{H}_5\text{OCH}_3$
 (c) $\text{C}_3\text{H}_7\text{OC}_2\text{H}_5$ (d) $\text{C}_2\text{H}_5\text{OC}_3\text{H}_7$

3. Name the following amines:

- (a) $\text{C}_2\text{H}_5\text{NH}_2$ (b) $\text{C}_3\text{H}_7\text{NH}_2$
 (c) CH_3NH_2 (d) $\text{C}_5\text{H}_{11}\text{NH}_2$

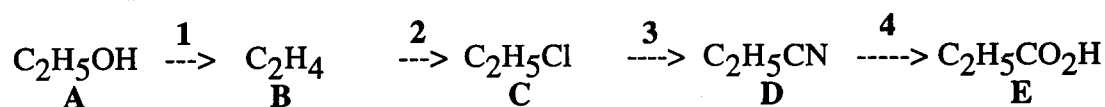
4. Name the following carboxylic acids:

- (a) $\text{C}_2\text{H}_5\text{CO}_2\text{H}$ (b) $\text{C}_4\text{H}_9\text{CO}_2\text{H}$
 (c) $\text{C}_3\text{H}_7\text{CO}_2\text{H}$ (d) HCO_2H

5. Predict the organic products of the following reactions.

- (a) 2 iodopropane and aqueous hydroxide ions
 (b) chloromethane and aqueous hydroxide ions.
 (c) 2 chloropropane and ammonia
 (d) chloromethane and ammonia
 (e) 1 bromopropane and methoxide ions
 (f) chloromethane and ethoxide ions

6. Cyanide ions are useful nucleophiles which can increase the length of the carbon chain in a compound. Look at the reaction sequence below in which compound A is converted into compound E.



- (a) Name the compounds A, B, C, and E.
 (b) Name the reaction types 1 to 4.

3.4 ANSWERS

1. (a) A nucleophile is an atom, ion or molecule that is attracted to positive charge. Hydroxide ^{ions} can act as nucleophiles because they have lone pairs of electrons and also because it has a negative charge.

(b) Halogens have higher electronegativity than carbon therefore a carbon to halogen bond will be polar covalent with carbon becoming slightly positive.

(c) Propan-2-ol and Sodium chloride.

2. (a) Methoxy methane

(b) Methoxy ethane

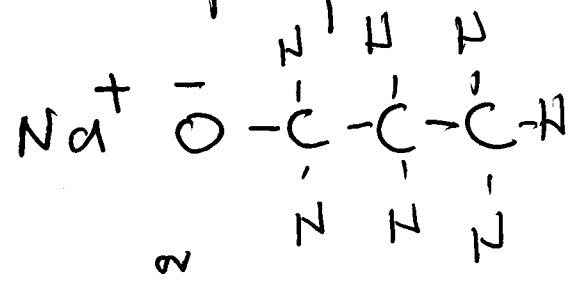
(c) ethoxy propane

(d) ethoxy propane

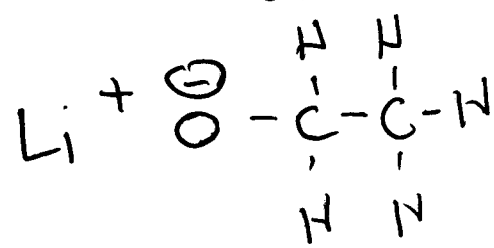
3-4 answers

3. (a) ethanamine or ethylamine
(b) propanamine or propylamine
(c) methanamine or methylamine
(d) pentanamine or pentylamine
4. (a) propanoic acid
(b) pentanoic acid
(c) butanoic acid
(d) methanoic acid
5. (a) propan-2-ol
(b) methanol
(c) 2-methylethanamine
(d) methanamine
(e) methoxypropane
(f) methoxyethane
6. (a) A - ethanol, B - ethene
C - chloroethane, E - propanoic acid
(b) 1 - dehydration (elimination)
2 - Addition
3 - Nucleophilic substitution
4 - hydrolysis

6. (a) Sodium propoxide



(b) Lithium ethoxide



(c) potassium butoxide

