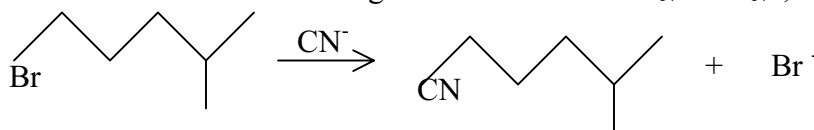


## Review Problems: Halogenoalkanes, R-X

1. Predict whether the following mechanism will be  $S_N1$  or  $S_N2$ , state your reasons.



2.  $S_N1$  reactions show 1<sup>st</sup> order kinetics. Explain what this statement means \_\_\_\_\_.

3. What choices for X and Y would **most** favour the following reaction:



4. The treatment of D-2-bromobutane with NaOH results in the production of a compound with L-configuration. The reaction has most likely taken place through which mechanism:  $S_N1$  or  $S_N2$ . Justify your answer.
5. Would the following reactants use  $S_N1$  or  $S_N2$  as their mechanism in a reaction?  
 $(CH_3)_3CX + NaOH_{(aq)} \rightarrow$

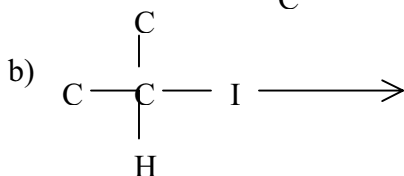
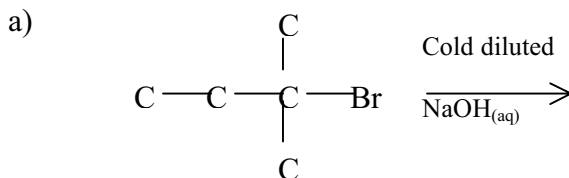
Justify your answer, and complete the mechanism for the reaction, giving the name of the product.

6. What are the conditions required for turning  $CH_3X \rightarrow CH_3OH$ , and would the reaction occur via the mechanism  $S_N1$  or  $S_N2$ ?

- 
7. State the anion and, if necessary, medium required for converting the following reactants to the following products:

- $C_2H_5Br \rightarrow C_2H_5OC_2H_5$
- $C_2H_5CN \rightarrow C_2H_5COOH$
- $C_2H_5Br \rightarrow C_2H_6$
- $C_2H_5Br \rightarrow C_2H_5NH_2$

8. What are the mechanisms, rate determining steps, and products of the following reactions?



9. Why is a nucleophilic attack on Br not possible?

## Answers

1)  $1^\circ \therefore S_N2$

2)  $\therefore$  Slow step indicates only 1 molecule

3)  $X = I^-$ ,  $Y = CN^-$

4)  $S_N2$

5)  $3^\circ \therefore S_N1$

6) Dilute, cold, aqueous  $OH^-$ , non-polar solvent

7) a)  $^-OC_2H_5$  in an alcoholic solvent

b)  $CN^-$  in dilute aqueous acidic,  $H^+ / H_2O$ , medium.

c) Reduction using  $LiAlH_4$

d) Ammonia in alcoholic medium

8) (a)  $S_N1$ , 2,2 dimethyl propanol,

(b) Via either  $S_N1$  or  $S_N2$  since it is secondary, product: propan-2-ol

9) Since lone pair on the halogen also participates in the delocalization of the benzene, thus C-X bond is stronger, also electron density on the carbon is increased, therefore, the electrophilic carbon is less likely to be attacked by the nucleophilic.