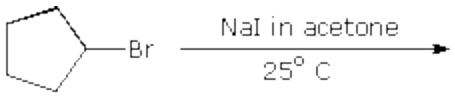
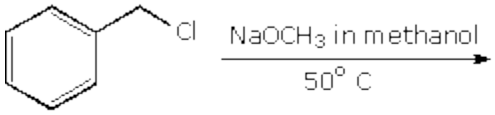
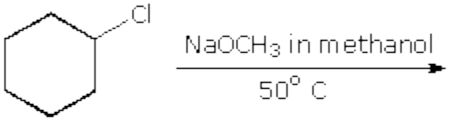
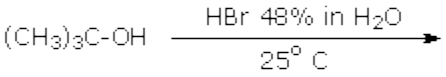
# TUTORIAL ORGANIC CHEMISTRY

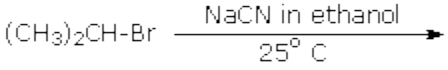
1. Draw the possible stereoisomers of tartaric acid (2,3-dihydroxy butan-1,4 dioic acid).
2. Draw a skeletal structure corresponding to each name below:
    a. (Z)-3-ethoxybut-2-en-1-ol
    b. (E)-1-bromo-4-ethylhept-3-ene
3. Explain why:
    a. 4-nitrophenol is a stronger acid than phenol
    b. Cyclopentadiene is unusually acidic (pKa 16)
4. Which substance in each of the following pairs is more reactive as a nucleophile? Explain
    a. i) $(CH_3)_2N^-$ or $(CH_3)_2NH$ (ii) $(CH_3)_3B$ or $(CH_3)_3N$ (iii) $H_2O$ or $H_2S$
5. Predict the mechanism by which reaction might happen.

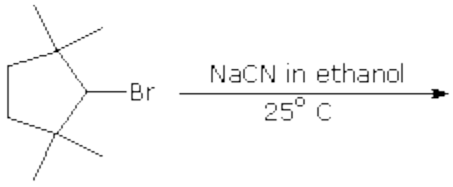


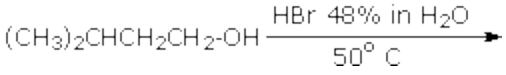



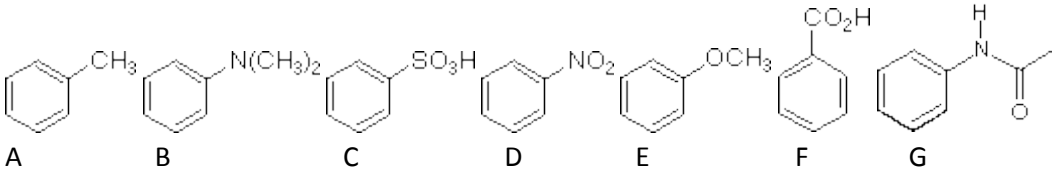



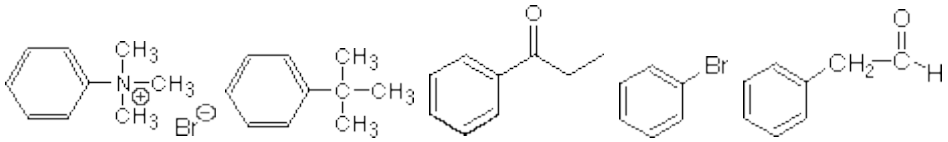



6. 3-Bromo-1-butene and 1-bromo-2-butene undergo $SN_1$ reaction at nearly the same rate even though one is a secondary halide and the other is primary. Explain.
7. When 1-iodo-1-methylcyclohexane is treated with $NaOCH_2CH_3$ as the base, the more highly substituted alkene product predominates. When $KOC(CH_3)_3$ is used as the base, the less highly substituted alkene predominates. Give the structures of the two products and offer an explanation
8. Of the following compounds, which will react rapidly with bromine ($Br_2$) at room temperature in the dark?

   Benzene, cyclohexene, cyclohexane, propanoic acid, phenol, nitrobenzene, hexyne, 2,2-dicholoropropane.
9. Which compounds undergo electrophilic nitration more rapidly than benzene? Which compounds give meta substitution under electrophilic bromination conditions?




A B C D E F G




H I J K L

10. Explain
    a. At what position in the ring bromination of phenyl benzoate is expected to occur
    b. Major products of nitration of acetophenone.

Answer key

5. (1) SN2, iodide anion is an excellent nucleophile and a very weak base.

(2) SN2, elimination is not possible, benzyl halides are very reactive.

(3) E2, methoxide anion is a strong base.

(4) SN1, this is a tertiary halide, and water is a good ionizing solvent.

(5) SN2, cyanide anion is a good nucleophile and a weak base.

(6) No Reaction, elimination is not possible and substitution is severely hindered.

(7) SN2, this is a primary halide. (some rearrangement may occur)

6. (1) A,B,E,G,I,L (2) C,D,F,H,J

Note that bromobenzene (K) is less reactive than benzene, but normally gives ortho/para substitution.