

Statement Type Questions:

1. A compound "X" on treatment with Cl_2 at 773 K gives another compound "Y" which on treatment with aqueous KOH gives allyl alcohol. What are "X" and "Y"?

Solution: Allyl alcohol, $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$ is obtained from "Y" with aqueous KOH. This means "Y" is allyl halide because allyl halides undergo nucleophilic substitution reactions. Also, halogen is chlorine because "Y" is obtained from "X" on treatment with Cl_2 at 773K. Thus, "Y" is $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Cl}$. Alkenes undergo allylic substitution at 773 K. Thus, alkene is, here, is $\text{CH}_3 - \text{CH} = \text{CH}_2$, which is "X".

The complete reaction is:



2. A compound "X" having molecular formula $\text{C}_7\text{H}_6\text{O}_3$ on treatment with acetic anhydride gives a product "Y" having molecular formula $\text{C}_9\text{H}_8\text{O}_4$ and acetic acid as product. "Y" is used as analgesics. What is "X" and "Y"?

Solution: Since, "Y" is used as antipyretics and has molecular formula $\text{C}_9\text{H}_8\text{O}_4$ which is formula of aspirin i.e. "Y" is aspirin. Also, aspirin is obtained by the treatment of "X" with acetic anhydride. Thus, "X" is salicylic acid. The complete reaction is as follow:



3. An organic compound "A" having molecular formula C_4H_8 on treatment with dil. H_2SO_4 give another compound "B". "B" on treatment with conc. HCl and ZnCl_2 gives "C" which is formed as soon as "B" is mixed with conc. HCl and ZnCl_2 . "C" on treatment with sodium ethoxide give back "A". Identify the compound "A", "B" and "C".

Solution: The molecular formula of "A" indicates that either it is alkene or cycloalkane. But, it cannot be cycloalkane because cycloalkane does not react with dil. H_2SO_4 . Thus, "A" is alkene either but-1-ene or but-2-ene or 2-methylpropene. Now, alkene on reaction with dil H_2SO_4 gives alcohol, "B" and product is formed immediately. This means alcohol is 3^o i.e. $(\text{CH}_3)_3\text{COH}$ and alkene is $(\text{CH}_3)_2\text{C} = \text{CH}_2$. "C" also gives "A" on treatment with sodium ethoxide. The complete reaction is as follow:



4. What happens when phenetole is heated with HI?

Solution: When phenetole is heated with HI, then phenol and iodo-ethane are formed as products. $\text{C}_6\text{H}_5\text{OC}_2\text{H}_5 + \text{HI} \xrightarrow{\text{heat}} \text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{CH}_2\text{I}$.

5. A compound "X" having molecular formula $\text{C}_6\text{H}_6\text{O}$, which is used as disinfectant. On treatment with conc. HNO_3 form a compound "Y" which is having high K_a value. Identify "X" and "Y". Write complete reaction.

Solution: Since, "X" is used as disinfectant and its molecular formula is $\text{C}_6\text{H}_6\text{O}$, so "X" may be phenol. Further, "X" on reaction with conc. HNO_3 produces a product "Y" having high K_a i.e. "Y" is an acid. Also, phenol on treatment with conc. HNO_3 gives picric acid having high K_a . Thus, "Y" is picric acid. The complete reaction is as follow:

