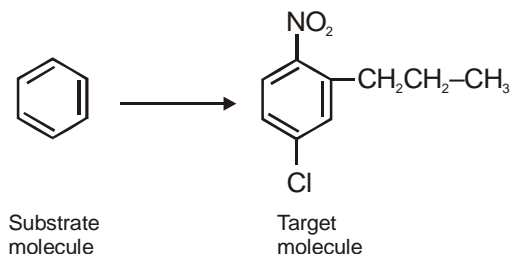


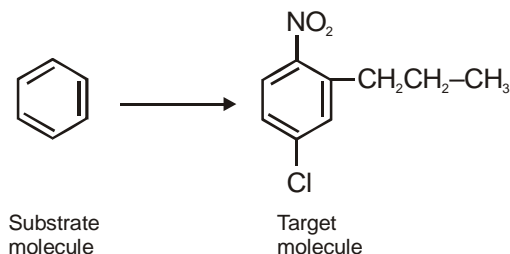
AROMATIC CONVERSIONS

Question: Carry out following conversions



Solution:

Step 1 : Identify the functional groups which are to be introduced in substrate molecule.



Conclusion: Three functional groups are introduced in benzene ring. They are

1. NO_2 nitro group
2. $\text{CH}_2\text{CH}_2\text{CH}_3$ propyl group
3. Cl chloro group

Step 2 : Look for the characteristic directing properties of the functional group.

1. Nitro group, it is meta directing and strongly deactivating (so it should not be I step of synthesis)
2. Cl group is ortho para directing and weakly activating group.
3. $\text{CH}_3\text{CH}_2\text{CH}_2$ is ortho para directing and weakly activating group.

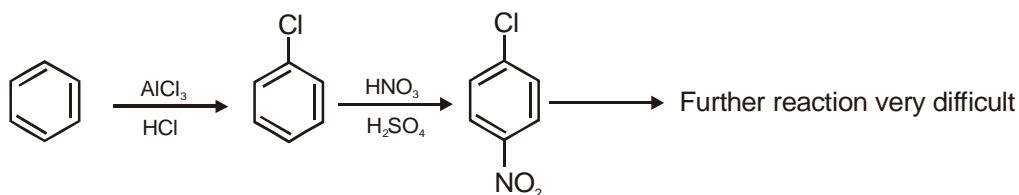
Step 3: Decide which functional group should be introduced first.

1. Nitro group should not be introduced first, as it deactivates the benzene ring. Moreover nitro benzene does not undergo alkylation reaction.

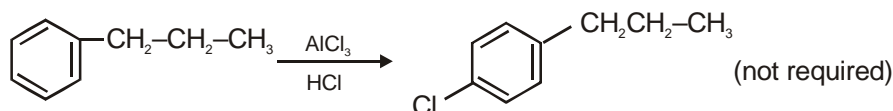


2. Cl group should not be used because it is ortho para directing. It can direct NO_2 group to para position but then it cannot direct propyl group to meta position.

Retro Synthesis



If $\text{CH}_3\text{CH}_2\text{CH}_2$ group is introduced first, then it will direct Cl group to para position .

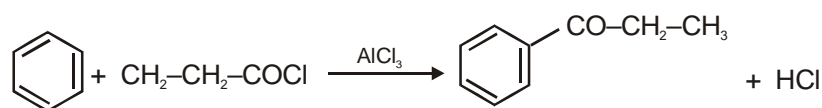


Moreover propyl chain cannot be introduced directly, because $\text{CH}_3\text{CH}_2\text{CH}_2^+$ carbocation is primary in nature and will rearrange itself to $\text{CH}_3\text{CH}^+\text{CH}_3$ cation, a secondary carbocation, which is more stable.

Keeping above points in mind, we require to introduce 3 carbon side chain in benzene nucleus, without letting side chain to rearrange. Secondly we want a meta directing group in benzene nucleus.

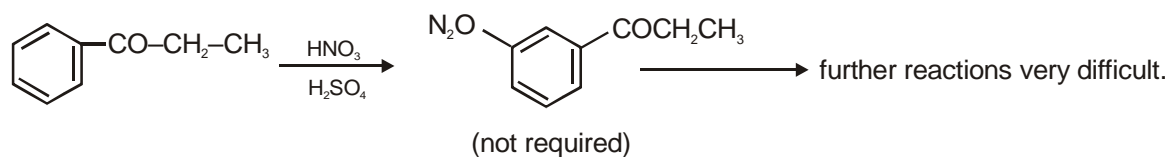
Step 4: Look for path way which meets above requirement. The possibilities are.

If $\text{CH}_3\text{CH}_2\text{CO}-$ group is introduced in benzene ring, it can fulfill above requirement. This can be done by **Fredel Craft acylation Reaction**.

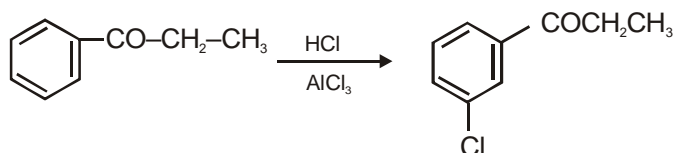


The >C=O group of COCH_2CH_3 is meta directing, and deactivating.

Now second step should be nitration, because it will strongly deactivate the benzene ring.

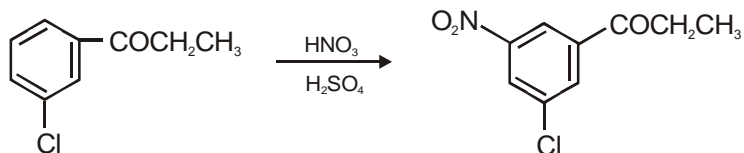


Therefore, this step 4, should be followed by chlorination



If the above molecule is further nitrated, nitro group would be introduced at meta position of COCH_2CH_3 group.

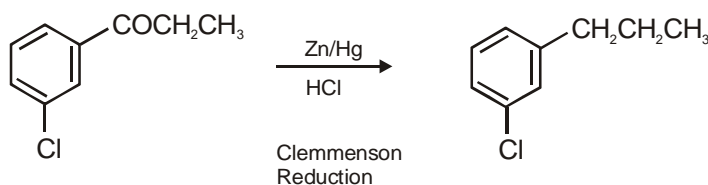
Retro Synthesis



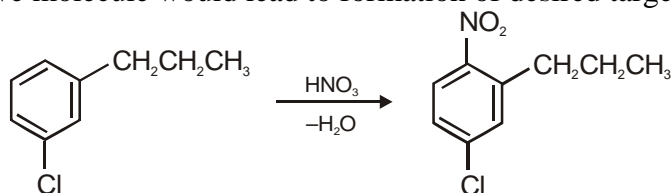
not our target molecule
Hence not required

To carry out further reaction we need an activating group which should be ortho/para directing in nature.

This can be achieved by reducing COCH_2CH_3 group to $\text{CH}_2\text{CH}_2\text{CH}_3$ group.



Finally, nitration of the above molecule would lead to the formation of the desired target molecule.



As $-\text{CH}_2\text{CH}_2\text{CH}_3$ group and Cl group both are ortho/para directing groups as well as they are placed in a manner that their directing behaviour reinforces one another's directing effect.

