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Aryl halides are less reactive than alkyl halides towards nucleophilic substitution reactions because of their resonance stabilization. The presence of a lone pair of electrons on the halogen atom is in conjugation with the π-electrons of the aromatic ring, resulting in partial double bond character and a stronger C−X bond. This makes it difficult to break the C−X bond and reduces the reactivity of aryl halides towards nucleophilic substitution reactions. (i) Aryl halides exhibit reduced reactivity in nucleophilic substitution reactions due to partial double bond character acquisition in C−Cl bonds resulting from resonance between benzene ring and lone pair of electrons on the halogen atom, thereby strengthening the bond.(ii) The carbon atom attached to the halogen in haloarenes is sp2 hybridised, making it more electronegative than sp3 hybridised carbon. This leads to a shorter C−Cl bond that is less susceptible to nucleophilic substitution reactions. (iii) Additionally, aryl halides cannot stabilise phenyl cations through resonance, ruling out the SN1 mechanism for these compounds. (iv) Aryl halides are also less reactive due to repulsion between the nucleophile and electron-rich arenes. However, the presence of an electron-withdrawing group at ortho or para positions can increase reactivity by facilitating nucleophilic attack at those positions, although this has no effect on haloarenes. Aryl halides are less reactive than haloalkanes due to their electron-rich aromatic rings, which repel nucleophiles and hinder bond breaking. However, the introduction of electron-withdrawing groups (-NO2) at ortho and para positions increases reactivity by withdrawing electrons from the benzene ring, facilitating nucleophile attack. The mechanism involves the formation of a carbanion through nucleophilic substitution, which is stabilized by resonance with the aromatic ring's π-electrons. This stabilization varies depending on the position of the -NO2 group, with o- and p-chlorobenzenes showing resonance-stabilized carbanions due to negative charge on the carbon bearing the -NO2 group. In contrast, meta-nitrochlorobenzene does not stabilize the carbanion, but rather relies on π-electron delocalization from the benzene ring. This effect allows for increased reactivity of aryl halides when electron-withdrawing groups are introduced at o- and p-positions, making them more susceptible to nucleophilic substitution reactions.

Explain why aryl halides are less reactive. Why aryl halides are less reactive than alkyl halides class 12. Why aryl halides are less reactive. Why aryl halides are less reactive than alkyl halides explain. Why alkyl halides are more reactive than aryl halides.