

Chapter 23: Aryl Halides

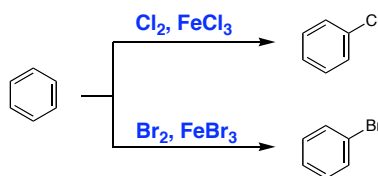
23.1: Bonding in Aryl Halides. Halide bonded directly to an aromatic ring. C-X bond of aryl halides are shorter and stronger than the C-X bond of alkyl halides.

23.2: Sources of Aryl Halides. (see Ch. 23.4)

23.3: Physical Properties of Aryl Halides. (please read)

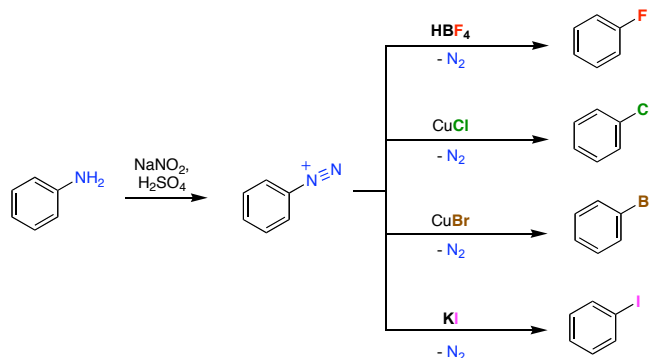
23.4: Reactions of Aryl Halides: A Review and Preview.

a. Electrophilic aromatic substitution of arenes (Ch. 12.5)

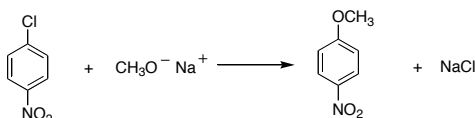


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b. From arylamines via the aryl diazonium ion (Ch. 22.17)

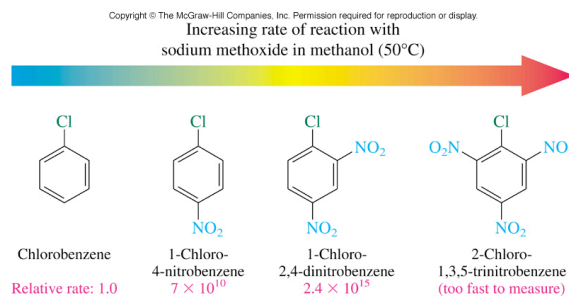


23.5: Nucleophilic Substitution in Nitro-Substituted Aryl Halides. Nucleophiles such as hydroxide, alkoxides, thiolate, ammonia, and 1° and 2° amines can displace an aryl halide when a *p*- or *o*-nitro group is present

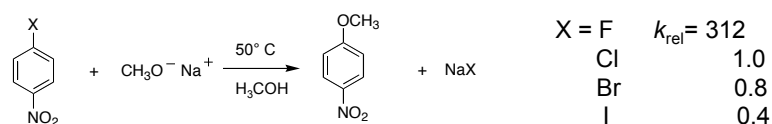


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Reactivity:



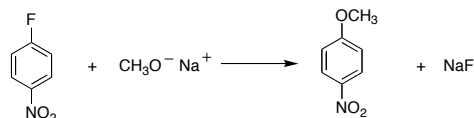
Nature of the leaving group:



$$\text{Rate} = k [\text{aryl halide}][\text{nucleophile}]$$

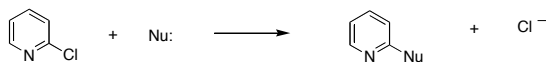
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Addition-elimination mechanism (Mech. 23.1, p. 971): The nucleophile adds to the carbon bearing the halide giving leading to an intermediate aryl anion (Meisenheimer complex), which is stabilized by the nitro group. The halide is eliminated giving the nucleophilic aromatic substitution product.

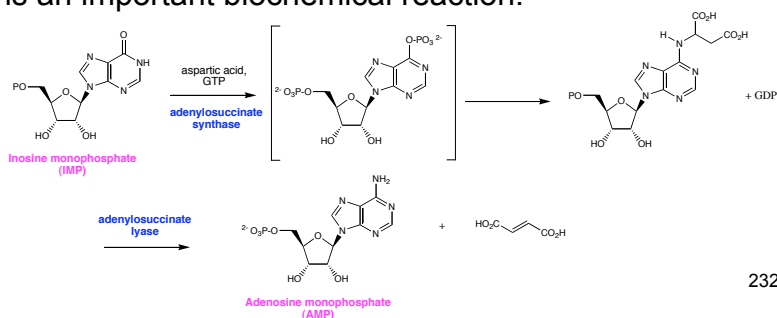


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23.7: Related Nucleophilic Aromatic Substitution. Halides of heteroaromatic compounds are reactive toward nucleophilic aromatic substitution

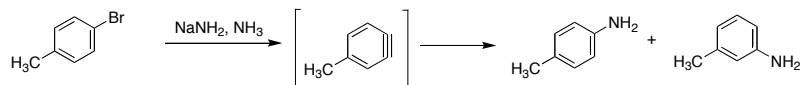


This is an important biochemical reaction.



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23.8: The Elimination-Addition Mechanism of Nucleophilic Aromatic Substitution: Benzyne.



23.9: Diels-Alder Reactions of Benzyne. (please read)

23.10: *m*-Benzyne and *p*-Benzyne. (please read)

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