**Supplement#4 Organic Chemistry II CHEM 4524 SUNY Alfred State**

***ELECTROPHILIC REACTIONS OF BENZENE SUMMARIZED (see also: Chapter 16)***

**key reactants solvents/conditions key electrophile product examples**

***(reaction name)***

 Fe/Cl2

X2 + FeX3 (or Fe) alcohols or acetic acid **X+**...FeX4- Ar-X benzene---------->chlorobenzene

X=Cl, Br in acetic acid **(can convert to phenol)1**

(F via F+-TEDA-BF4 = `Selectflor’)

(I+ via 2Cu2+ +I2 🡪 2Cu+ + 2I+)

***(halogenation)***

 conc HNO3/H2SO4

HNO3  conc HNO3 /H2SO4 **NO2+** Ar-NO2 benzene -------->nitrobenzene

***(nitration)*** **(can be run w/HNO3 only) (can convert to aniline)2**

 conc fuming H2SO4

SO3 in conc fuming H2SO4 **SO3**Ar-SO3H benzene---------> benzenesulfonic acid

fuming H2SO4 (**saturated with SO3 dissolved in acid**) room temp

***(sulfonation)***

 EtCl neat

RCl +AlCl3  neat or with freons **R+...**AlCl4- Ar-R benzene -------> ethylbenzene

***(Friedel-Crafts alkylation)*** AlCl3

 (**can convert isopropyl benzene to phenol)3**

 1:1 CH3-COCl/AlCl3

RC-X +AlCl3 neat or with CH2Cl2 **RCO+...**AlCl3X- ArC-R benzene-------> acetophenone

 || acyl/AlCl3 in 1:1 ratio || in CH2Cl2

 O ***(Friedel-Crafts Acylation)*** O

1 classic route to phenol from chlorobenzene 2common routes to aniline from nitrobenzene 3Industrial route to phenol from cumene





