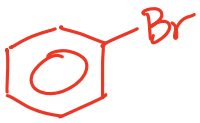
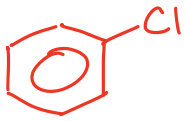
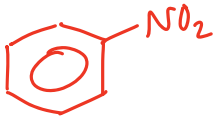
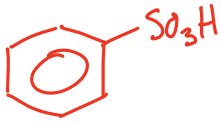
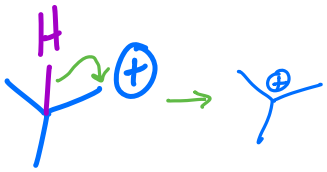
Chapter 18 Worksheet – Reactions of Benzene and its Derivatives

18A. EArS Benzene Monosubstitution

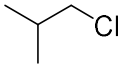
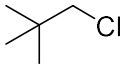
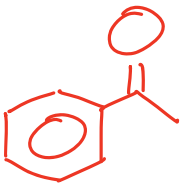
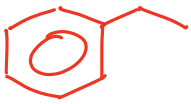
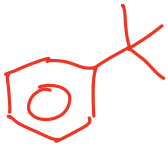
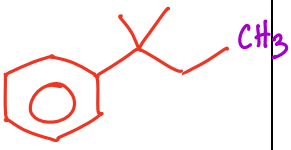
1. Benzene can do all the things! Draw the product of the reaction of benzene with reagents **(a)** through **(h).** You may want to do the mechanisms first, then add the products below.

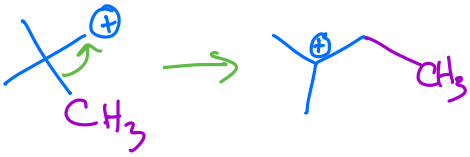
Halogenation, Nitration, & Sulfonation

	(a) Br_2, $FeBr_3$	**(b)** Cl_2, $FeCl_3$	**(c)** HNO_3, H_2SO_4	**(d)** Fuming H_2SO_4
				



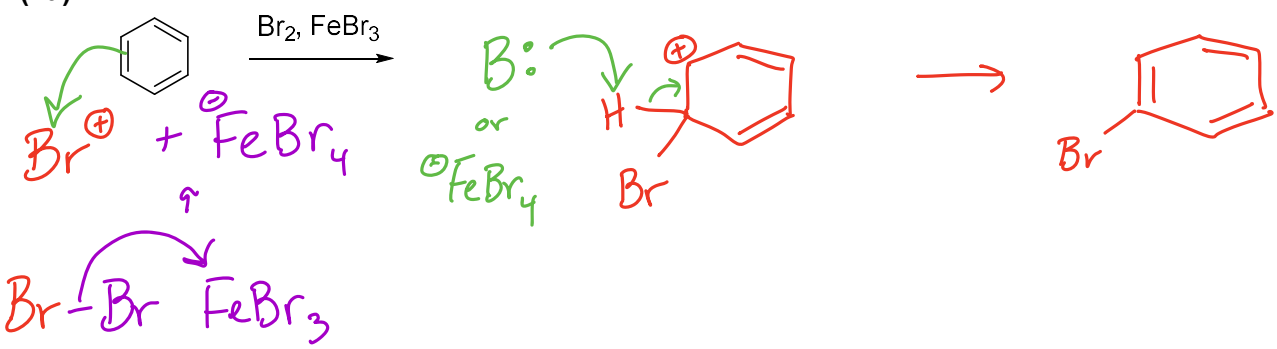
Friedel-Crafts Reactions

	(e)  $AlCl_3$	**(f)** CH_3CH_2Cl, $AlCl_3$	**(g)**  $AlCl_3$	**(h)**  $AlCl_3$
			Hydride shift 	methyl shift 

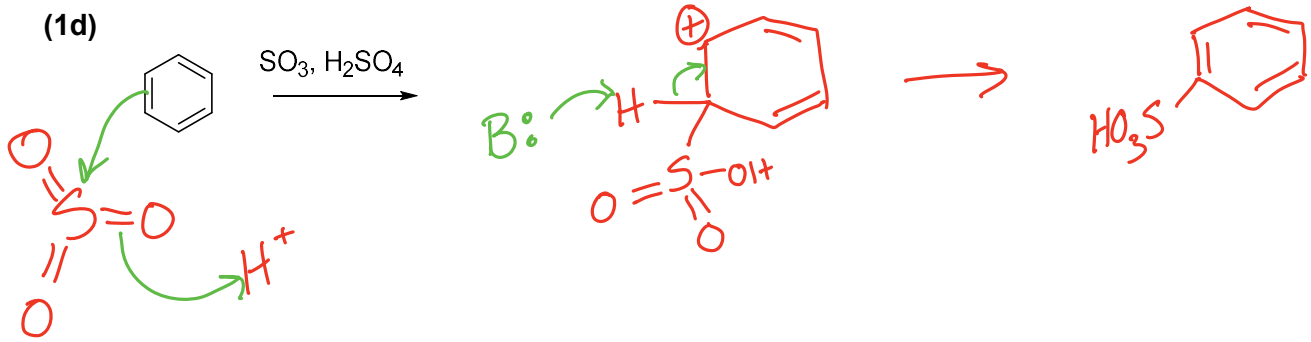


18A. EArS Mechanisms: Draw the arrow-pushing mechanism and product for the following reactions. There should be at least one reaction intermediate.

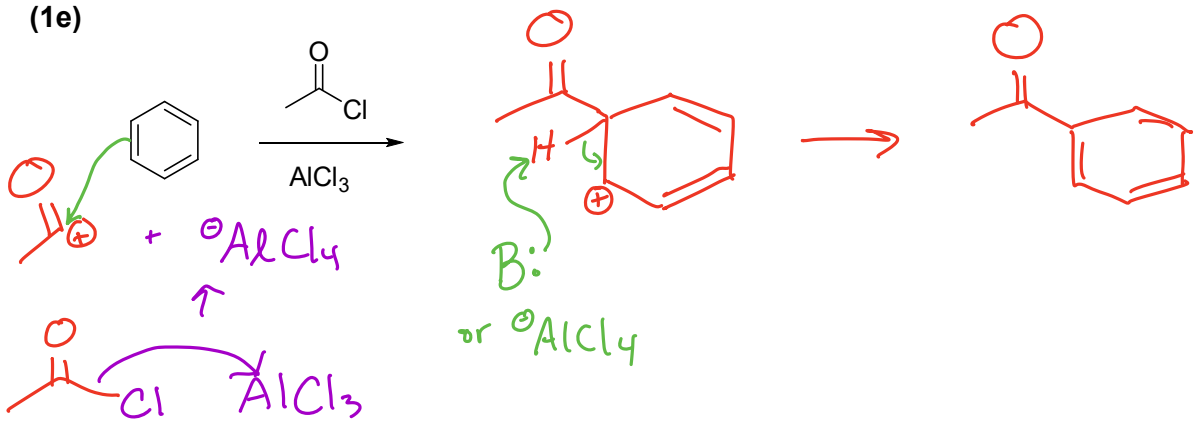
(1a)



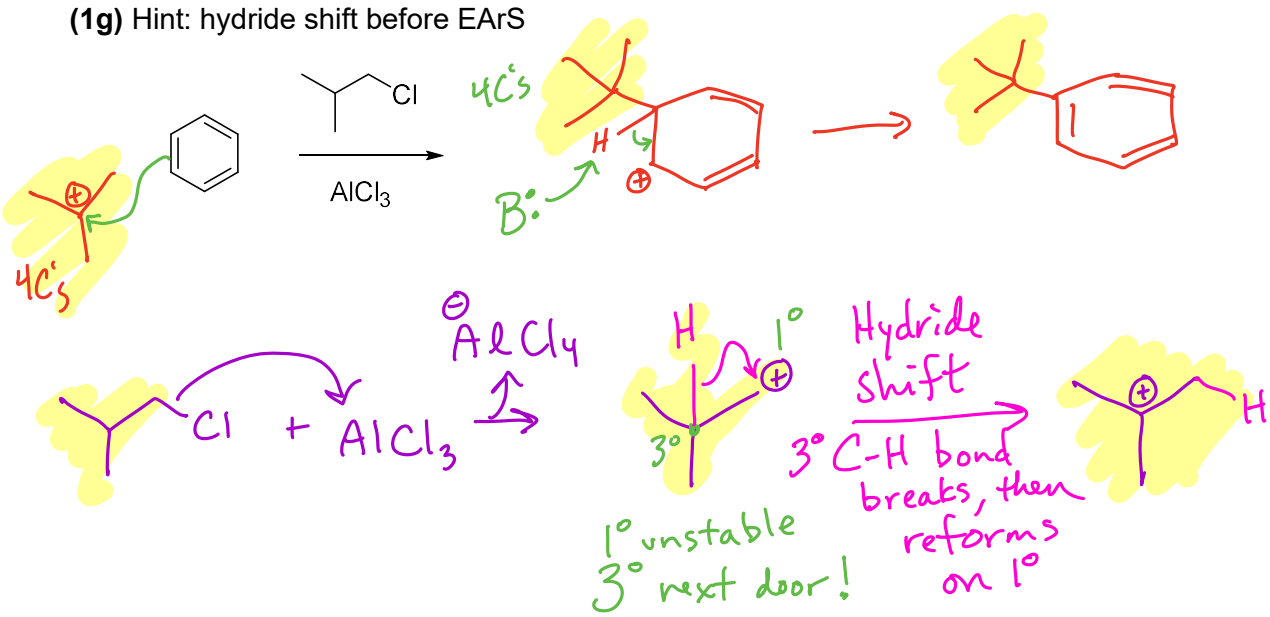
(1d)



(1e)

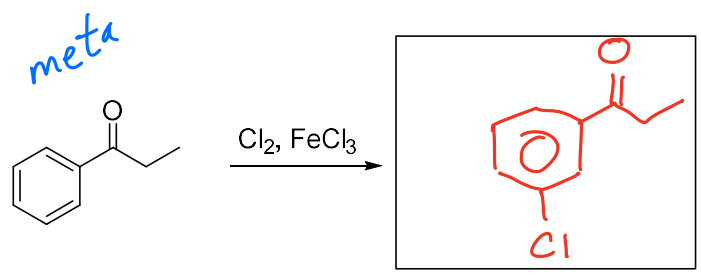


(1g) Hint: hydride shift before EArS

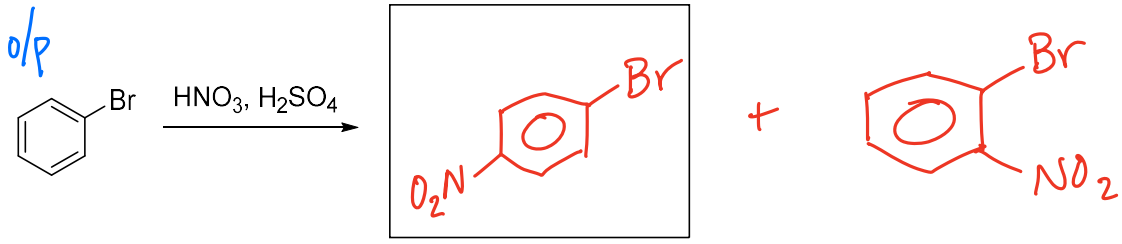


18B. Disubstitution with EArS - Note: some of the reactions have two products (ex. Ortho & para directors). Draw the second product to the right of the box, no need to squeeze 'em both into one 😊

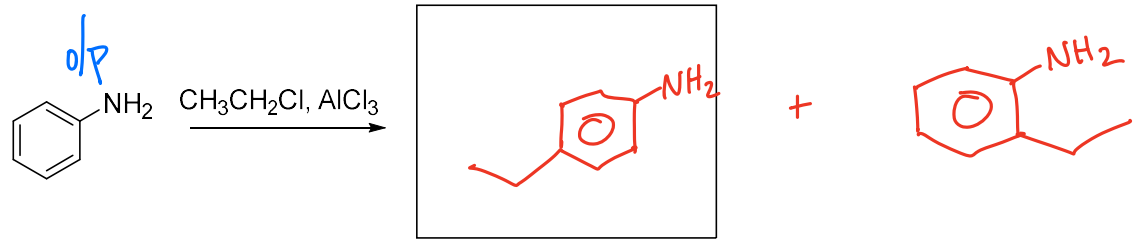
(2b)



(3c)

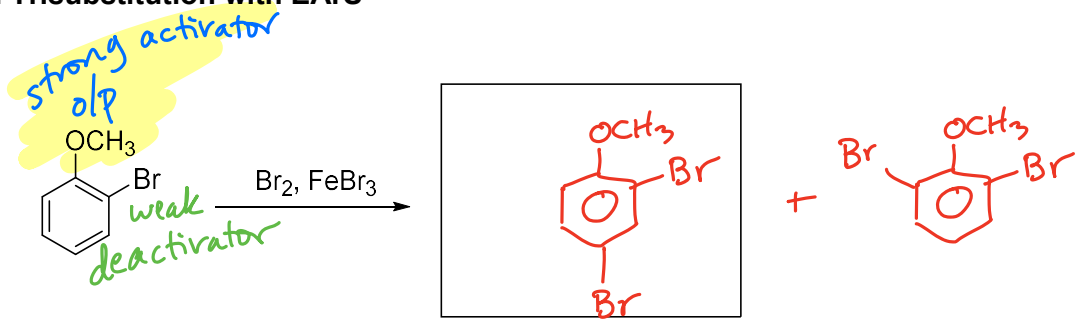


(4f)

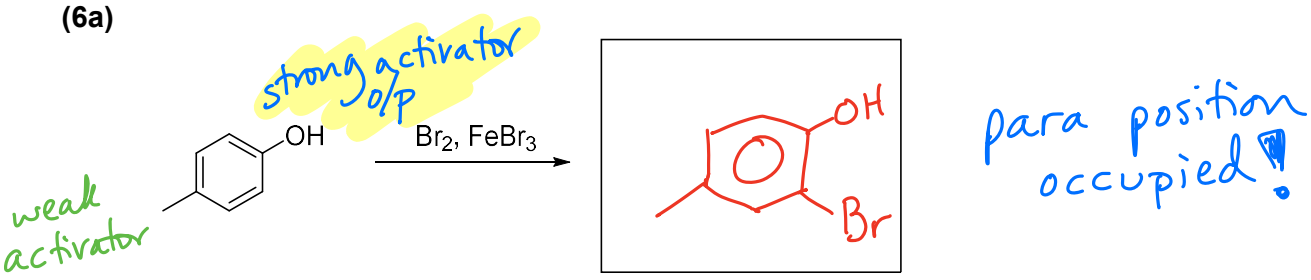


18C. Trisubstitution with EArS

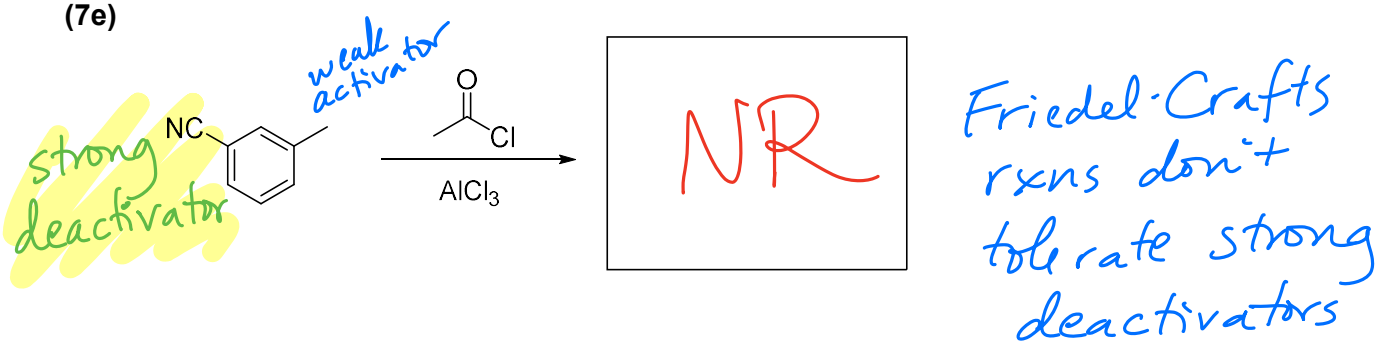
(5a)



(6a)

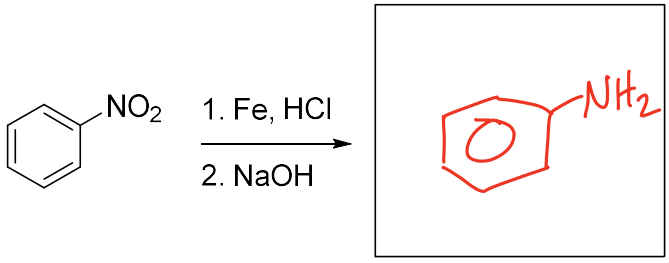


(7e)



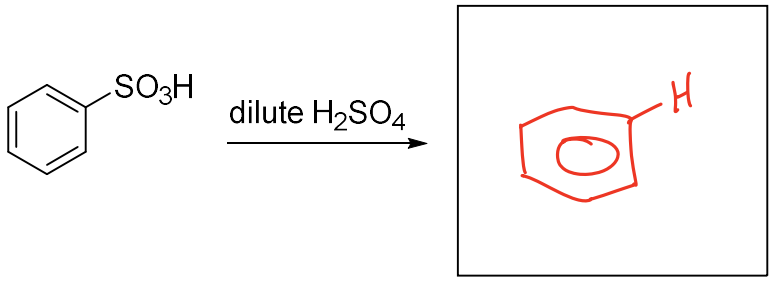
18B. Substituted Benzene Reactions – fill in the box

(8) Nitrobenzenes

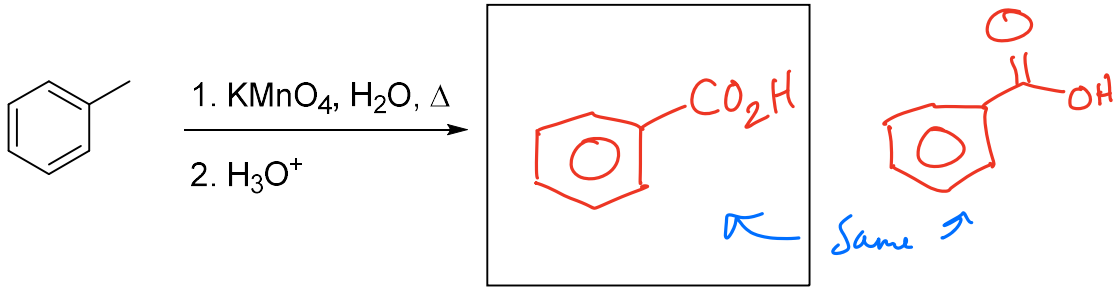


reduction

(9) Benzene sulfonic acids

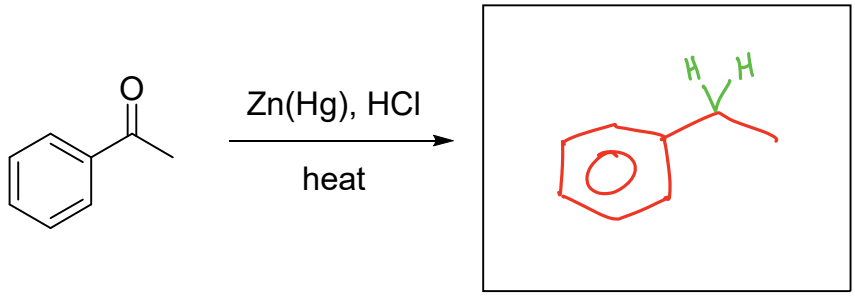


(10) Alkyl benzenes - Chapter 17.6



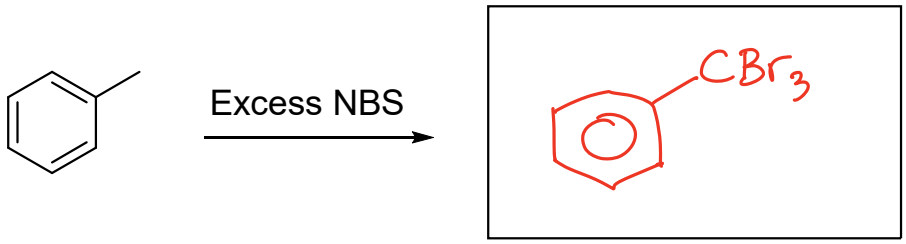
strong oxidation!

(11) Acyl ketones



strong reduction only when C=O is right next to ⬡

(12) Methyl benzene (toluene) – Chapter 17.6

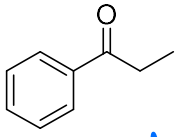
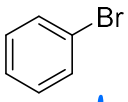
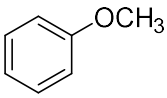
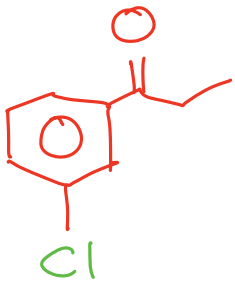
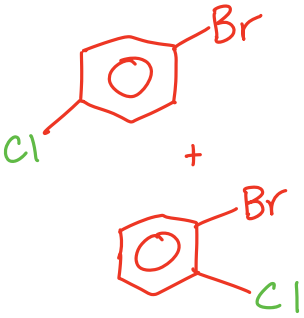
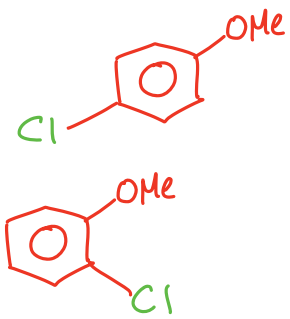
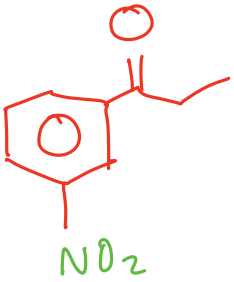
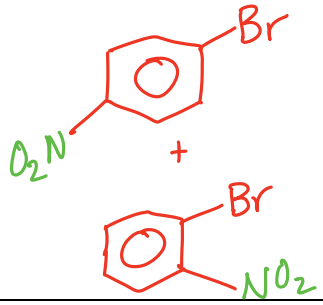
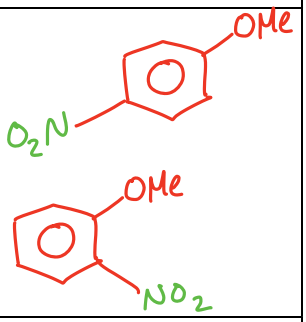
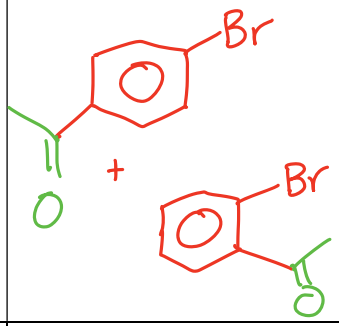
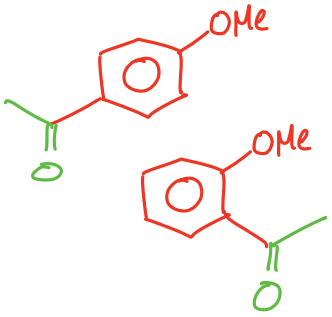
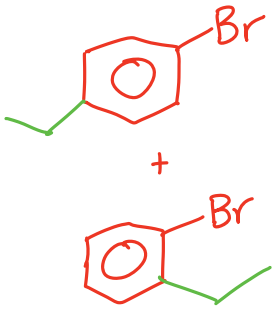
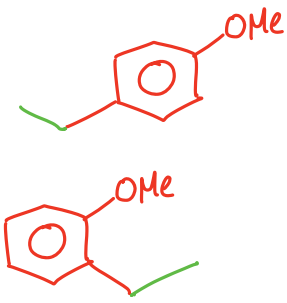


benzylic bromination

BONUS: Mix & Match with Reaction Bootcamp!

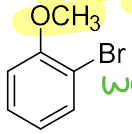
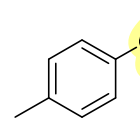
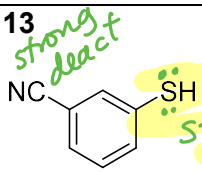
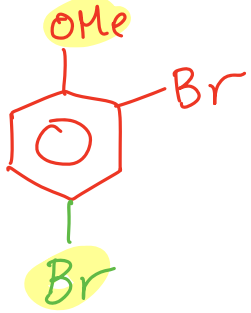
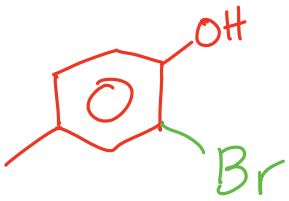
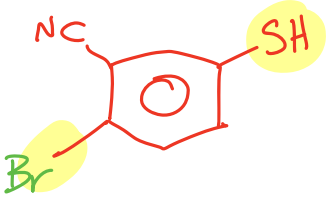
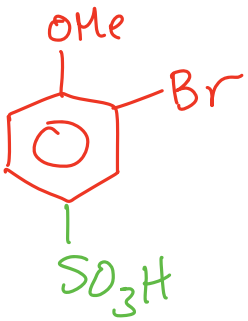
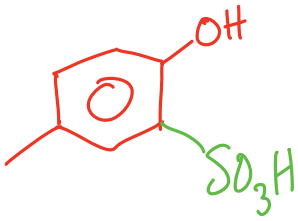
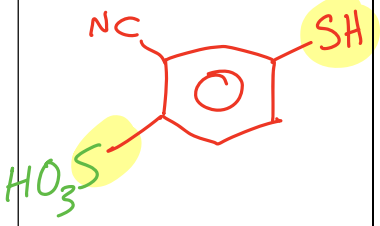
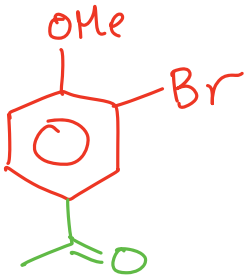
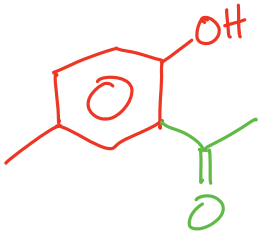
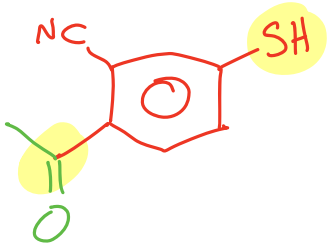
II. DISUBSTITUTED BENZENES

Draw the products of monosubstituted benzenes **2-5** with reagents **(a)-(f).**

	2  strong deactivator meta-director	**3**  weak deactivator ortho/para director	**4**  strong activator o/p director
(b) Cl_2, $FeCl_3$			
(c) HNO_3, H_2SO_4			
(e)  $AlCl_3$	NR Friedel-Crafts rxns don't tolerate strong deactivators		
(f) CH_3CH_2Cl, $AlCl_3$	NR		

BONUS: Mix & Match with Reaction Bootcamp!

III. POLYSUBSTITUTED BENZENES

Note: *drawing para products for simplicity. ortho products present too	5  strong act o/p; weak deact	6  strong act. o/p; weak act; para occupied! ortho only	13  strong deact; strong act. o/p
(a) Br_2, $FeBr_3$			
(d) SO_3, H_2SO_4			
(e)  $AlCl_3$			
(f) CH_3CH_2Cl, $AlCl_3$