

Aromaticity and Benzene #2: Electrophilic Aromatic Substitution (EAS) Mechanisms

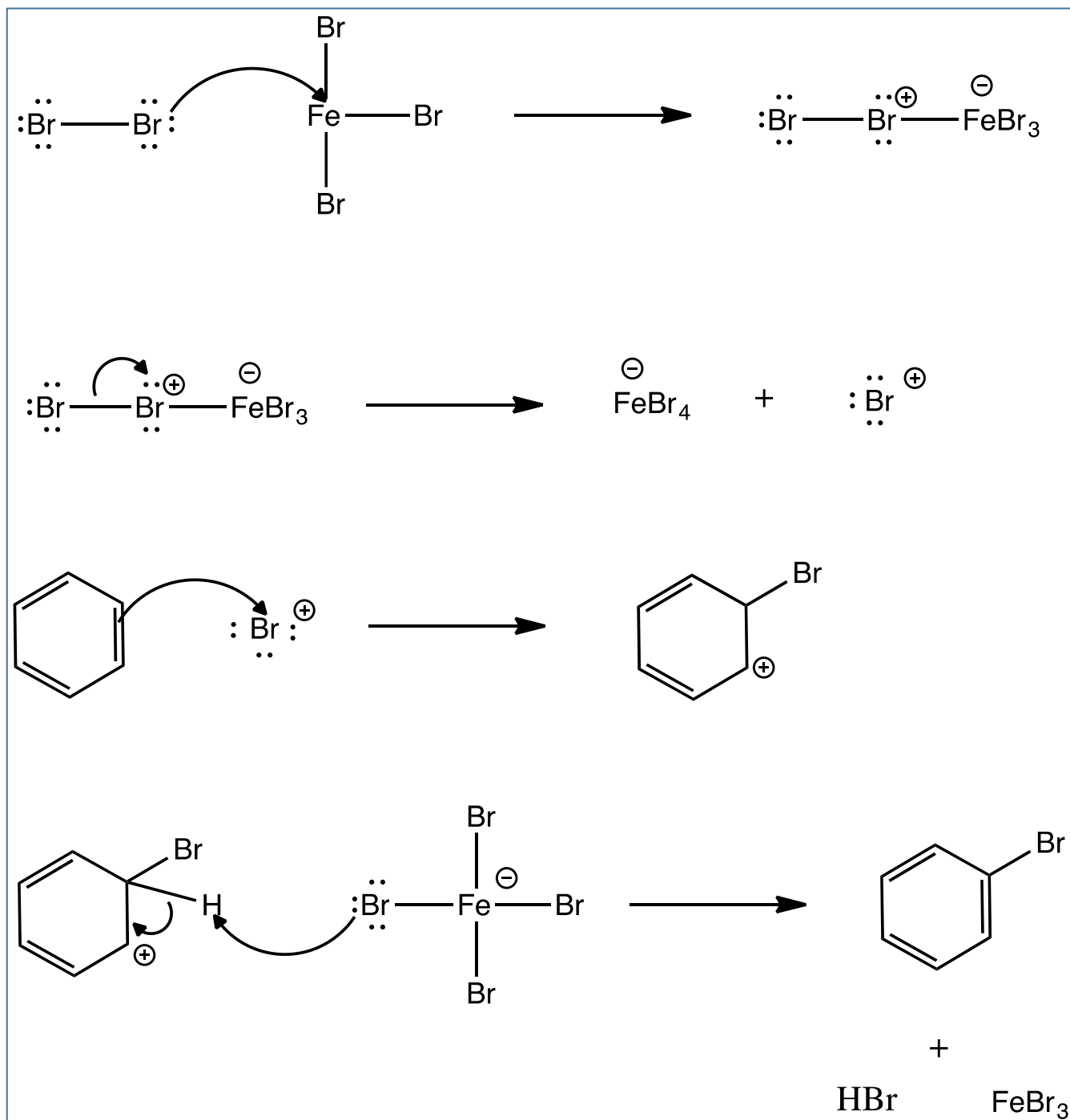
Hey, everybody. Okay, so before we charge ahead on the next worksheet (or not, if you're an eager beaver and went ahead anyways), here are the **SIX** EAS Mechanisms I guarantee you will be responsible for knowing no matter what school you are taking O Chem 2 at. Do me and yourself a favor and **know these like the back of your hand**. If you don't know the back of your hand, flip that sucker over, take a good look, then practice these mechanisms until you're a boss at them 😊.

Like we said in the last video, they are almost ALL the same. The only thing that varies are the steps you show to produce the electrophile you end up sticking on benzene (remember, electrophile = "lover of negative charge" so they are usually positive atoms/molecules).

Listed below are the mechanisms (with some footnotes) that appear on the following pages:

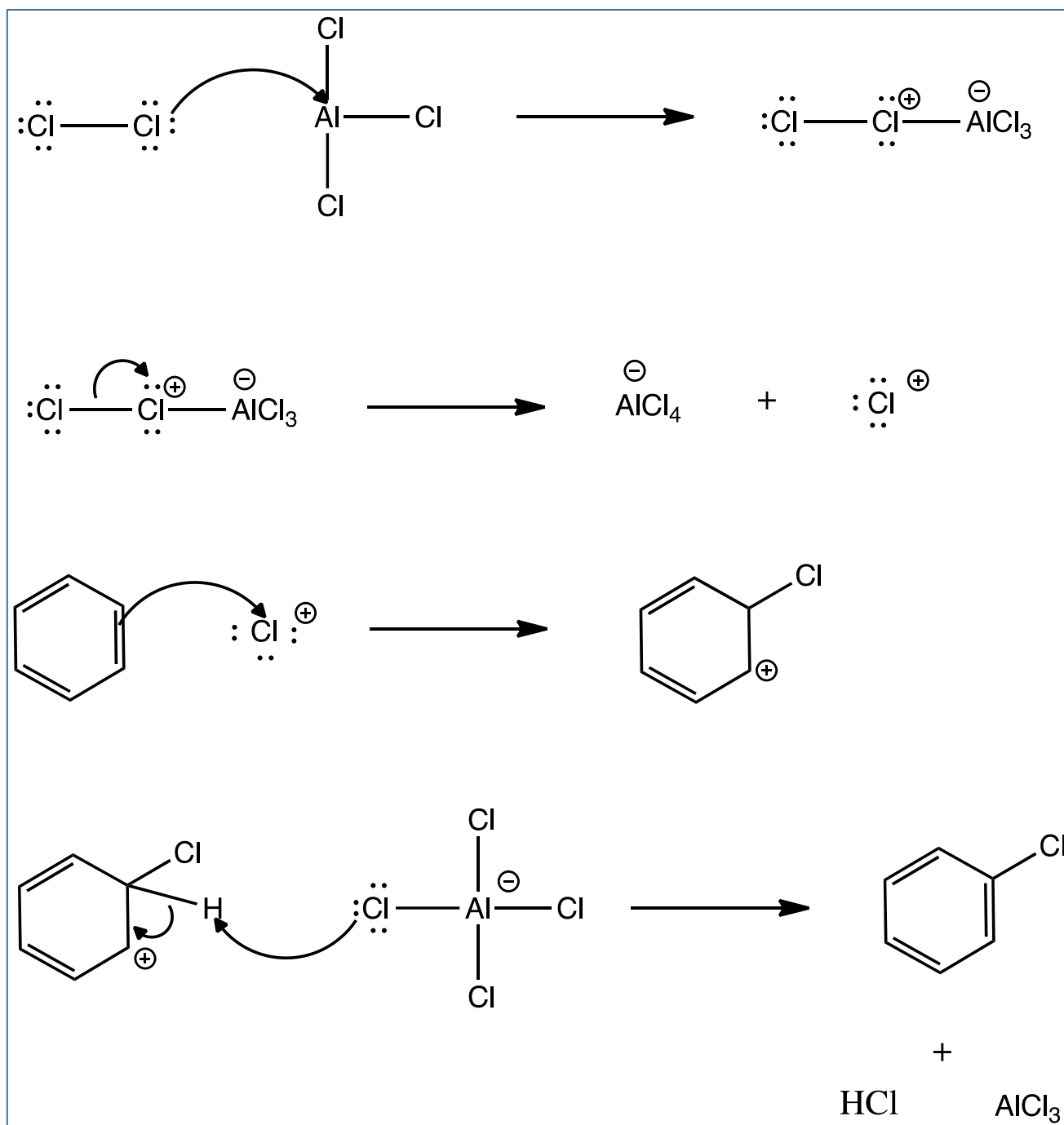
- 1.) Bromination of Benzene
- 2.) Chlorination of Benzene
- 3.) Nitration of Benzene
- 4.) Sulfonation of Benzene
- 5.) Friedel-Crafts Alkylation of Benzene
- 6.) Friedel-Crafts Acylation of Benzene

1.) Bromination of Benzene



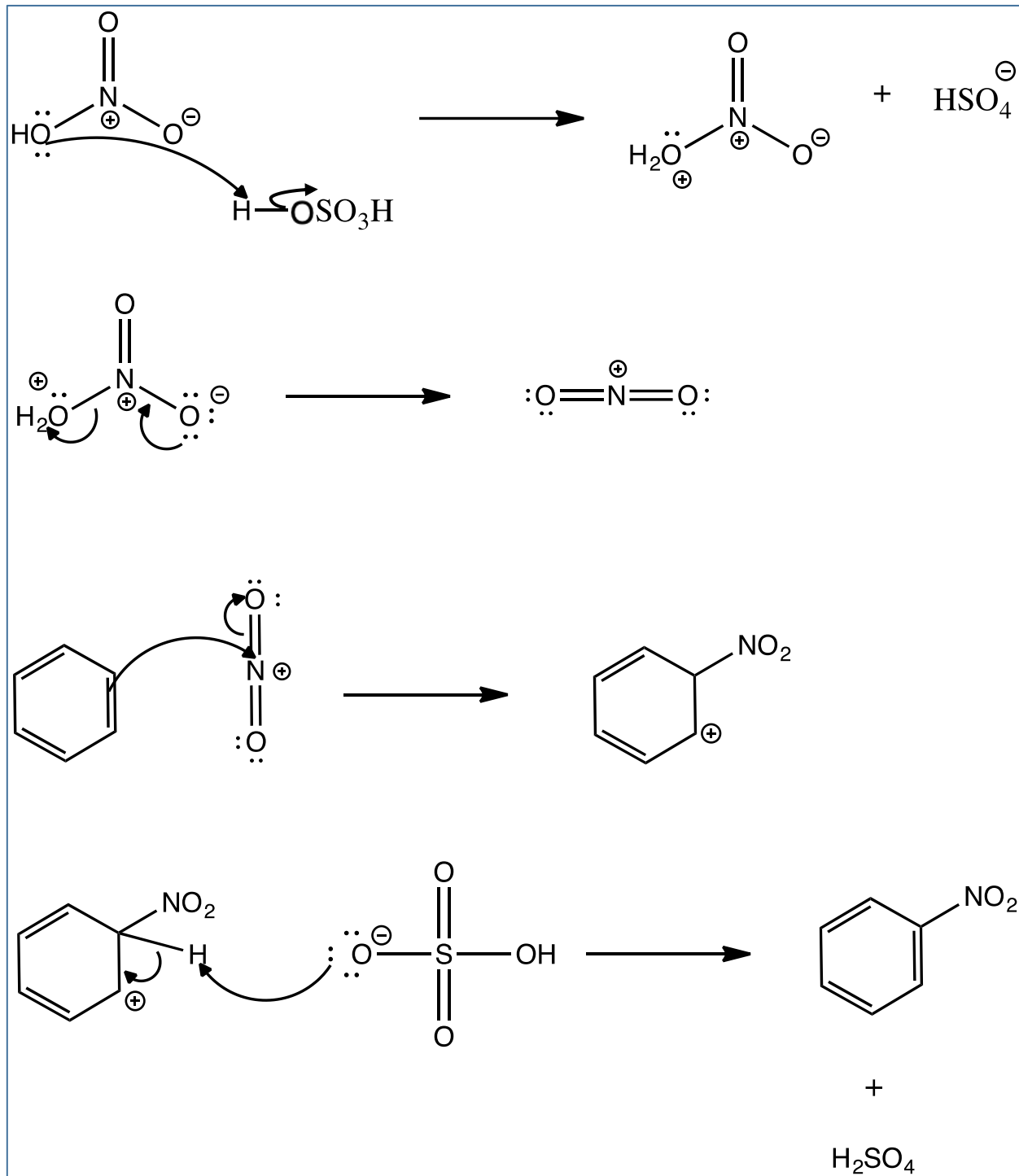
--This is identical to the Chlorination Mechanism: The only thing that changes is that you use FeBr_3 as the catalyst and bromines instead of using AlCl_3 and chlorines

2.) Chlorination of Benzene



--This is identical to the Bromination Mechanism: The only thing that changes is that you use AlCl_3 as the catalyst and chlorines instead of using FeBr_3 and bromines

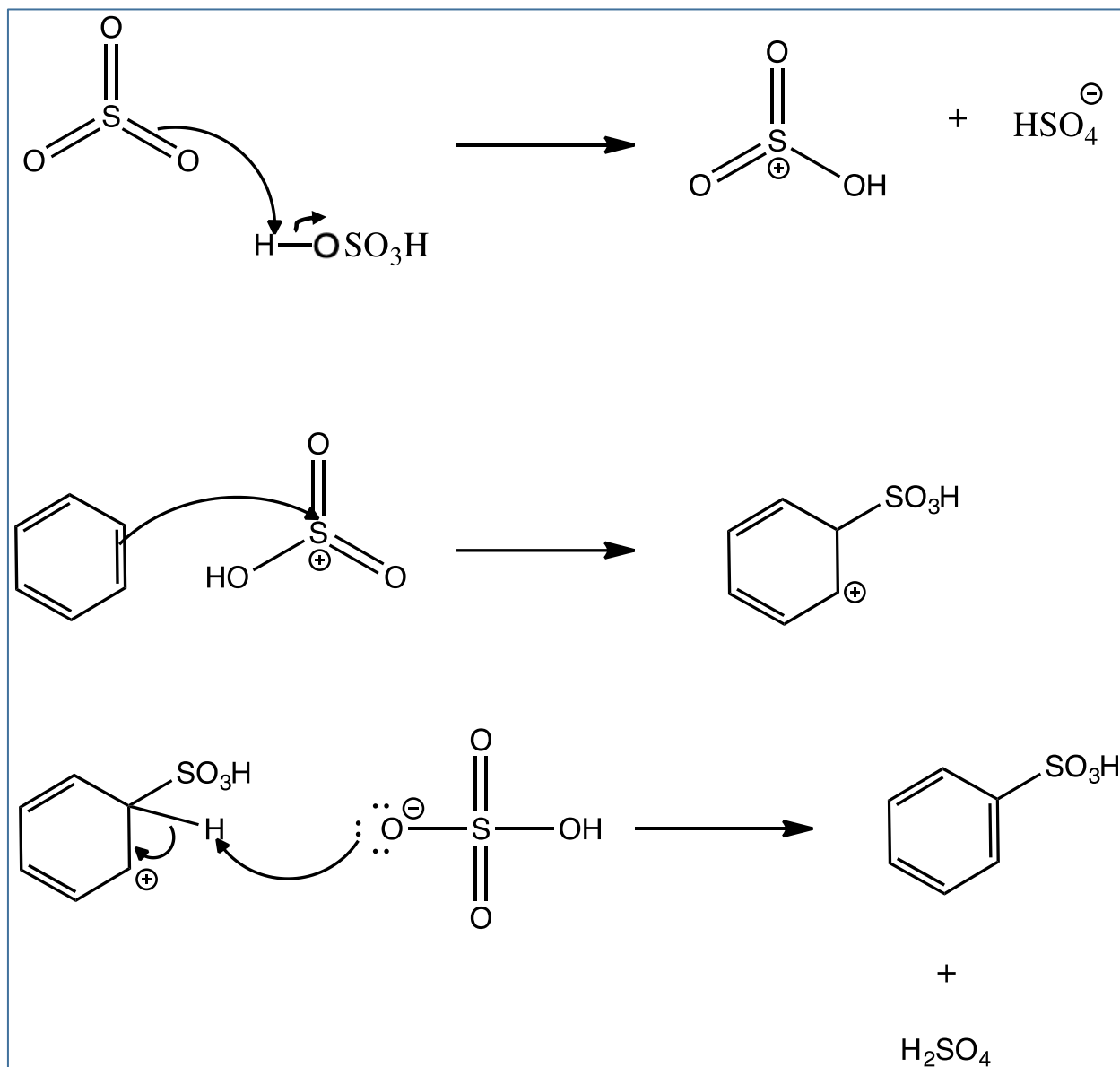
3.) Nitration of Benzene



--Remember how to draw the Lewis Structures for HNO_3 and H_2SO_4

--After you produce the NO_2^+ ion, all of the steps are the same for attaching the electrophile to benzene

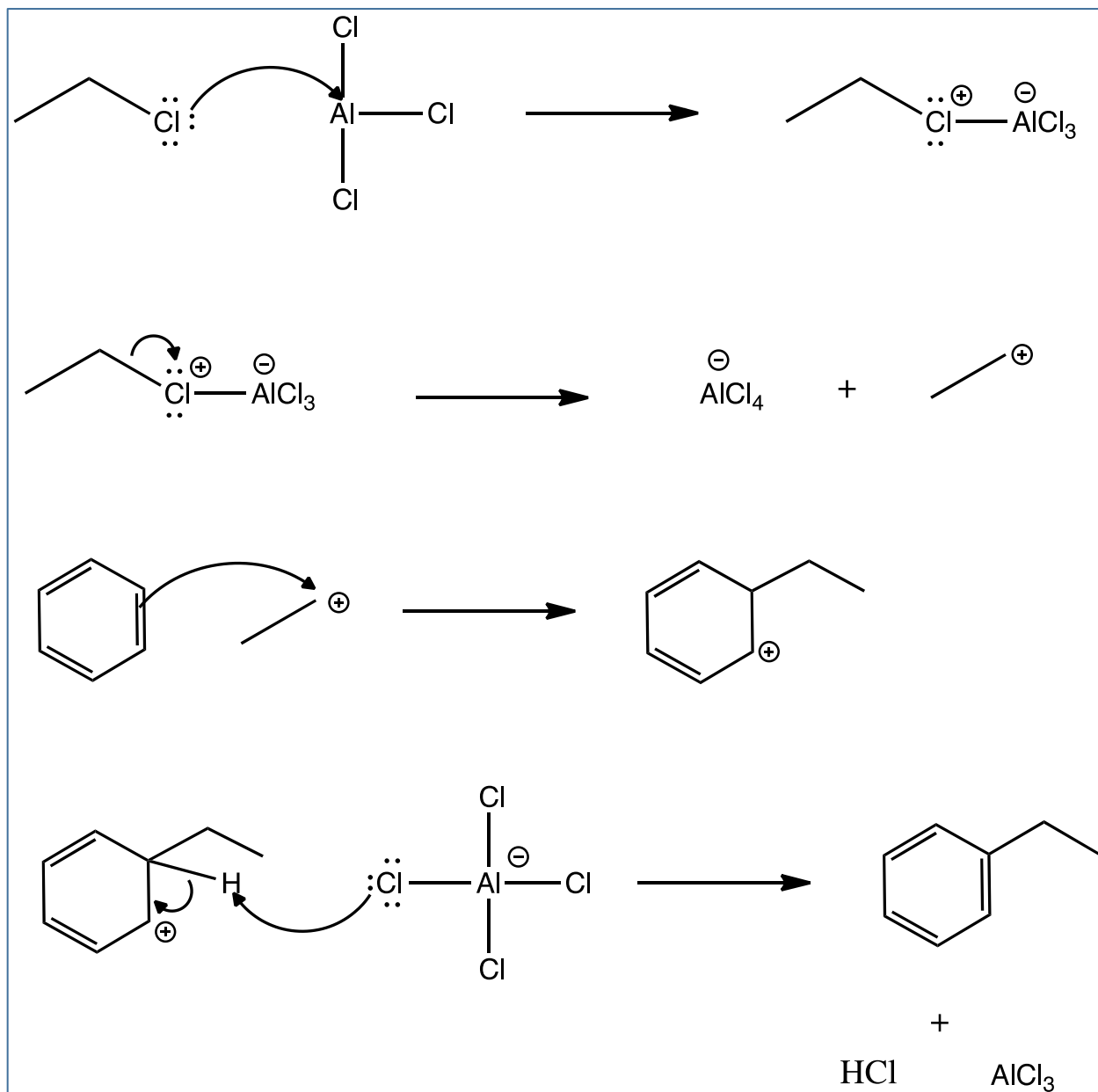
4.) Sulfonation of Benzene



--Remember how to draw the Lewis Structures for SO_3 and H_2SO_4

--After you produce the SO_3H^+ ion, all of the steps are the same for attaching the electrophile to benzene

5.) Friedel-Crafts Alkylation of Benzene—with Ethyl Chloride

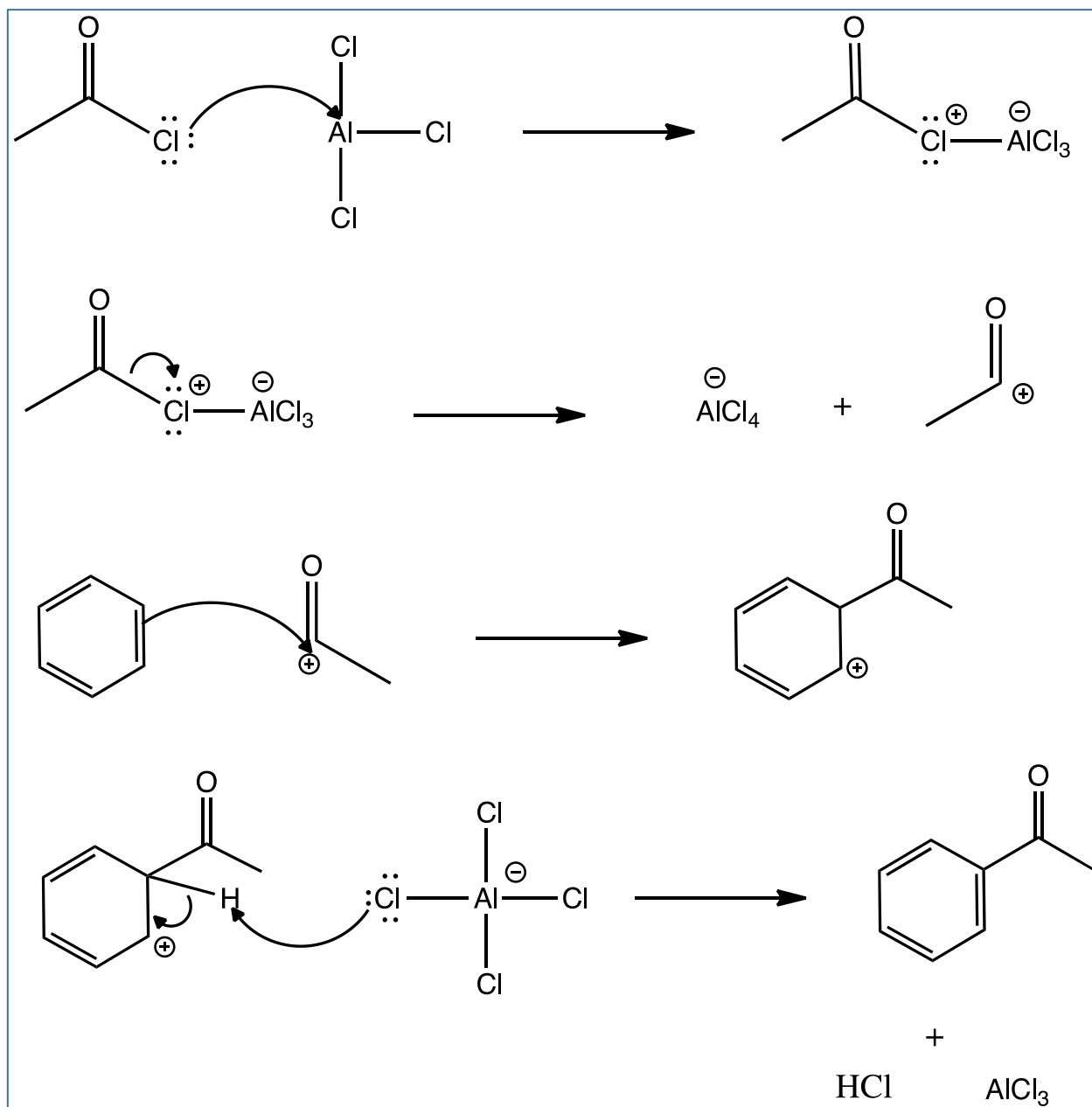


--Remember: You need an Alkyl Chloride (ethyl chloride in this case)

--BE CAREFUL: Carbocation shifts (methyl and hydride) can occur

--After you produce the carbocation (and check for carbocation shifts), all of the steps are the same for attaching the electrophile to benzene

6.) Friedel-Crafts Acylation of Benzene—with Acetyl Chloride



--Remember: You need an Acid Chloride (acetyl chloride in this case)

--No need to worry about shifts: The carbonyl being present eliminates the possibility of carbocation shifts

--After you produce the carbocation, all of the steps are the same for attaching the electrophile to benzene