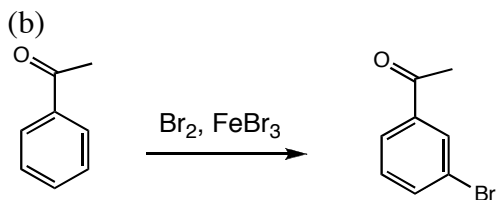
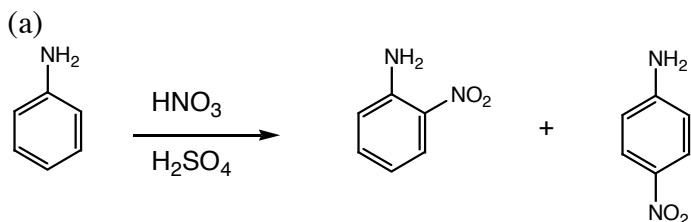


## Chemistry 218, Problem Set 6

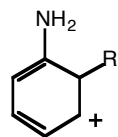
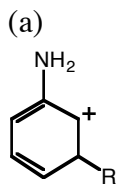
Recommended problems from the text: 17.3-17.4, 17.10, 17.12-17.16, 17.18-17.22, 17.25-17.31, 17.33-17.42, 17.44-17.45, 17.53, 18.1-18.24, 18.32 (a-g), 18.33-18.37, 18.40-18.48, 18.51, 18.54 (a-e), 18.64-18.65

(Recommended problems from the text, 1<sup>st</sup> ed.: 17.3-17.4, 17.9, 17.11-17.15, 17.17-17.21, 17.24-17.31, 17.33-17.44, 17.50, 18.1-18.25, 18.34 (a-g), 18.35-18.39, 18.42-18.51, 18.54, 18.57 (a-e), 18.66-18.67)

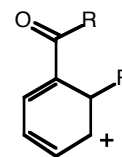
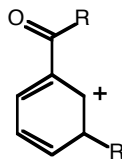
1. Draw mechanisms for each product formed in the following transformations. Include ALL resonance structures of carbocation intermediates.



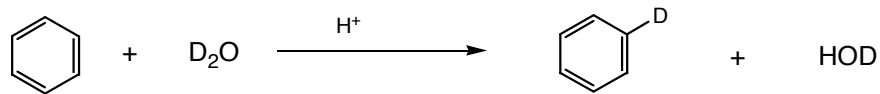
2. Choose the most stable carbocation from each of the following pairs.



(b)



3. (a) If benzene is treated with sulfuric acid for several days at room temperature in the presence of  $D_2O$ , the following reaction occurs:

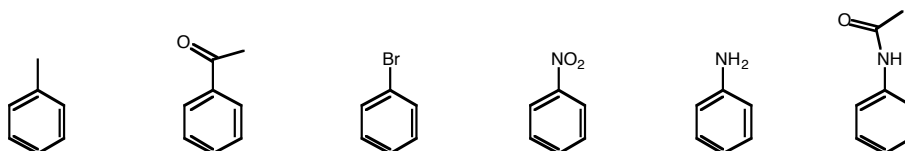


Draw a mechanism to explain the reaction. (Hint: what happens first when you put acid into water?)

- (b) Predict the products of the reaction if toluene were used as the starting material instead.
4. Predict whether single or multiple substitution is expected for the following reactions with benzene, if the reagents are used in a large excess. Explain WHY.
- Nitration
  - Sulfonation
  - Friedel-Crafts alkylation
  - Friedel-Crafts acylation
  - bromination

5. Draw a reaction coordinate for an EAS reaction with a halobenzene compared to benzene.

6. Each intersection of the following table represents a reaction. What products (if any) are formed in each reaction? Which reactions occur more rapidly than the analogous reaction on benzene itself? Assume only mono substitutions occur.



$\text{Br}_2, \text{FeBr}_3$

$\text{HNO}_3, \text{H}_2\text{SO}_4$

$\text{AlCl}_3, \text{MeCl}$

$\text{AlCl}_3, \text{CH}_3\text{COCl}$