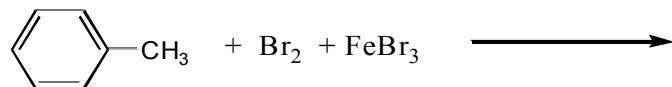


Exercise 9: Substituted benzenes

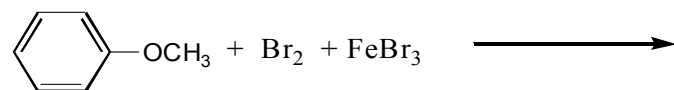
Shown below is the electrophilic aromatic substitution reaction of toluene with bromine and ferric bromide.



a. In step #1 of this reaction, note that the electrophile (Br^+) can attach at 3 different positions in relationship to the CH_3 group. Depict the cation that will be produced from each different attachment (show all pertinent resonance structures for each cation).

b. Draw the possible reaction product(s) of this reaction. State which product would be produced in the greatest yield and lowest yield.

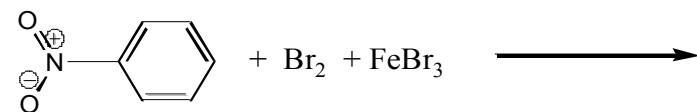
2. Shown below is the reaction of anisole with bromine and ferric bromide.



a. In step #1 of this reaction, note that the electrophile (Br^+) can attach at 3 different positions in relationship to the OCH_3 group. Depict each cation that will be produced from each different attachment (show all pertinent resonance structures).

b. Draw the possible reaction product(s) of this reaction. State which product would be produced in the greatest yield and lowest yield.

3. Shown below is the reaction of nitrobenzene with bromine and ferric bromide.



a. In step #1 of this reaction, note that the electrophile (Br^+) can attach at 3 different positions in relationship to the nitro group (NO_2). Depict each cation that will be produced from each different attachment (show all pertinent resonance structures).

b. Draw the possible reaction product(s) of this reaction. State which product would be produced in the greatest yield and lowest yield.

4. Rank the order of reactivity with Br^+ between toluene, anisole and nitrobenzene (fastest to slowest) and briefly explain why.

5. Draw the most likely product for the reaction below.

