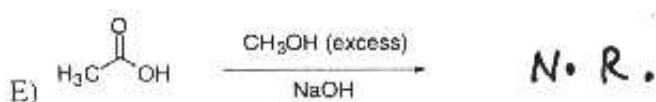
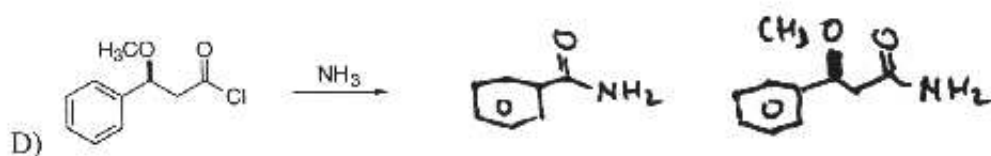
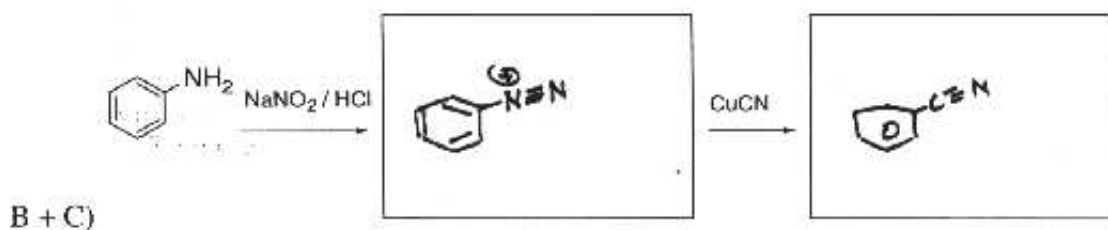
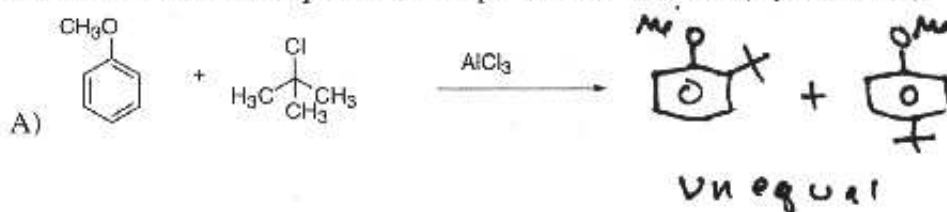
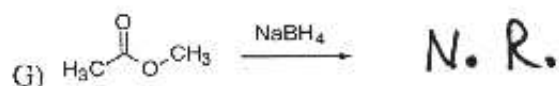
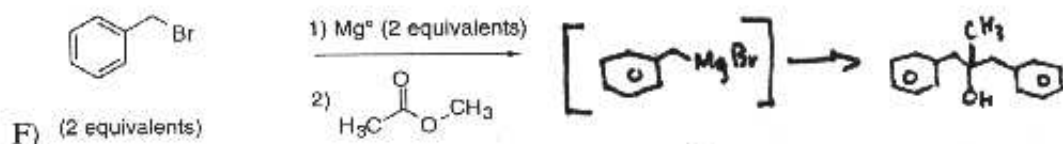
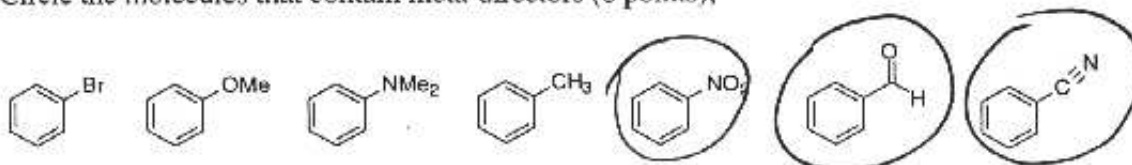


1) Provide the products of the following reactions. If no reaction would occur, write NR. Indicate the stereochemistry of the products where appropriate. If more than one isomer will be formed, draw both isomers and indicate if they will be formed in equal or unequal amounts. There is an aqueous work up after each reaction (4 points each).

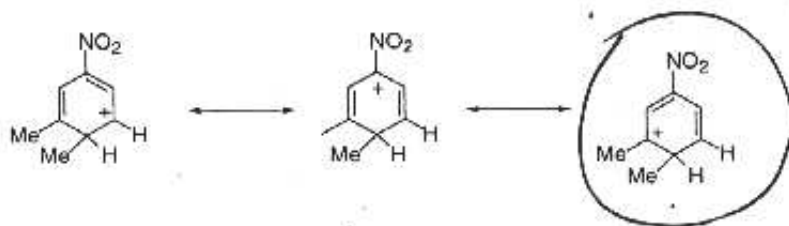
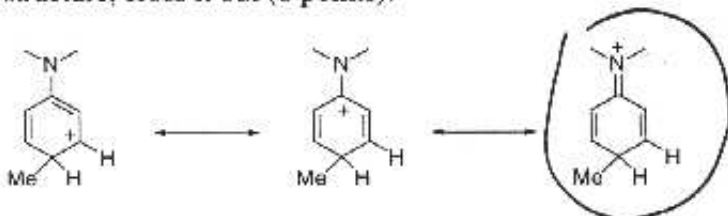




Circle the molecules that contain meta-directors (6 points);

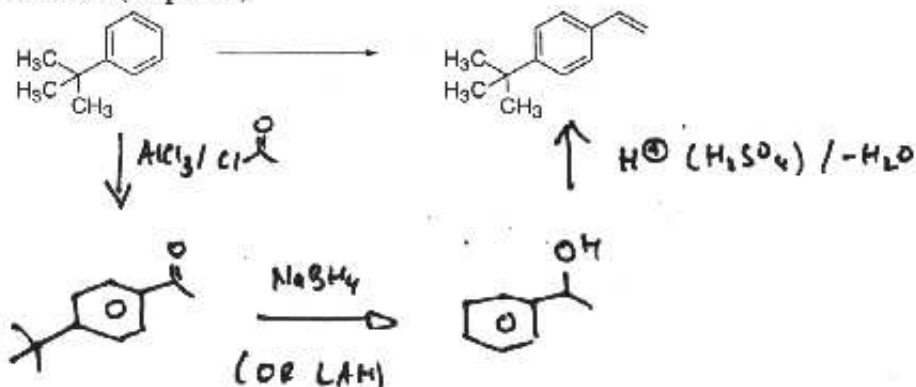


Circle the best resonance structures. If one of the structures is not a valid resonance structure, cross it out (6 points):

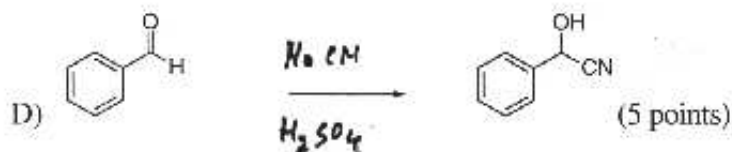
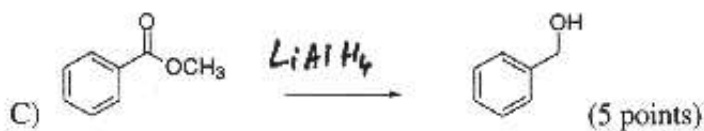
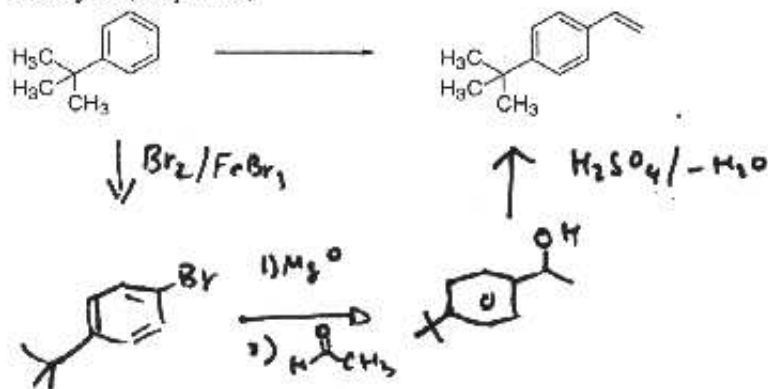


2) Complete the syntheses shown below using organic reagents of 5 carbons or less and any inorganic reagents you wish. For partial credit, write the product of each reaction. You don't have to write aqueous work ups, I'll assume you will do one after each step.

A) NOTE: Provide a synthesis of this compound using the Friedel-Crafts acylation reaction (12 points).



B) NOTE: Provide a synthesis of this compound using a Grignard addition to an aldehyde (12 points).



3) Provide a mechanism for the following reactions

