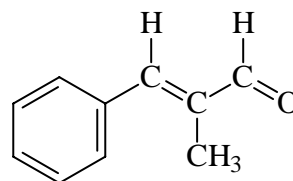
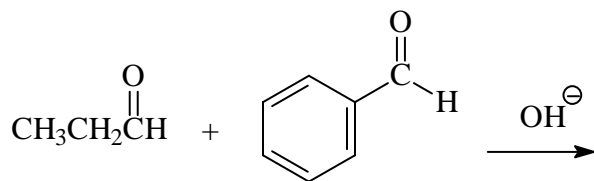
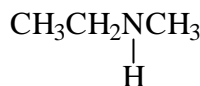
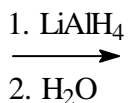
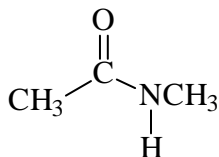
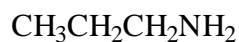
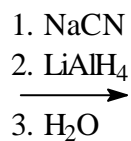
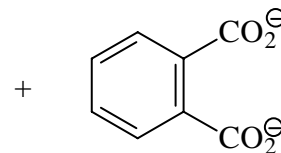
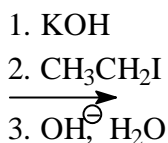
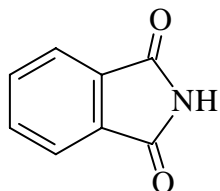
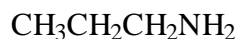
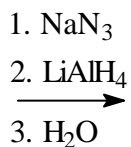
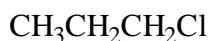
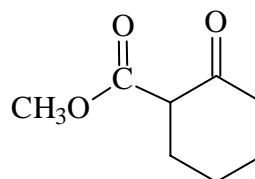
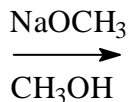
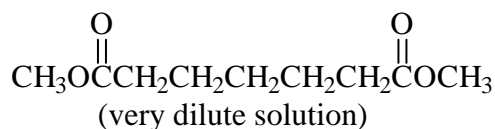
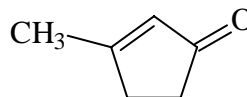
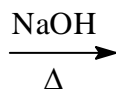
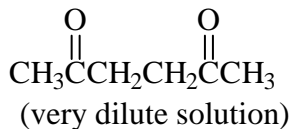
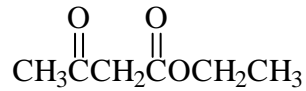
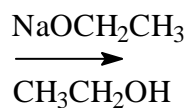
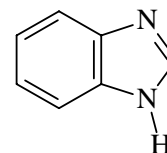
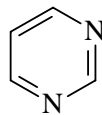
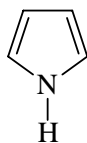
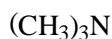


1. (16) Draw the structure of the major organic product of each of the following:



2. (4) Write an acceptable name under each of the following amines:



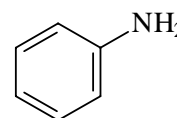
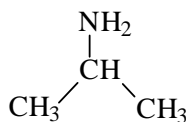
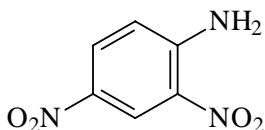
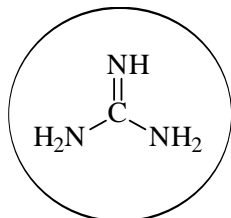
*trimethylamine*

*pyrrole*

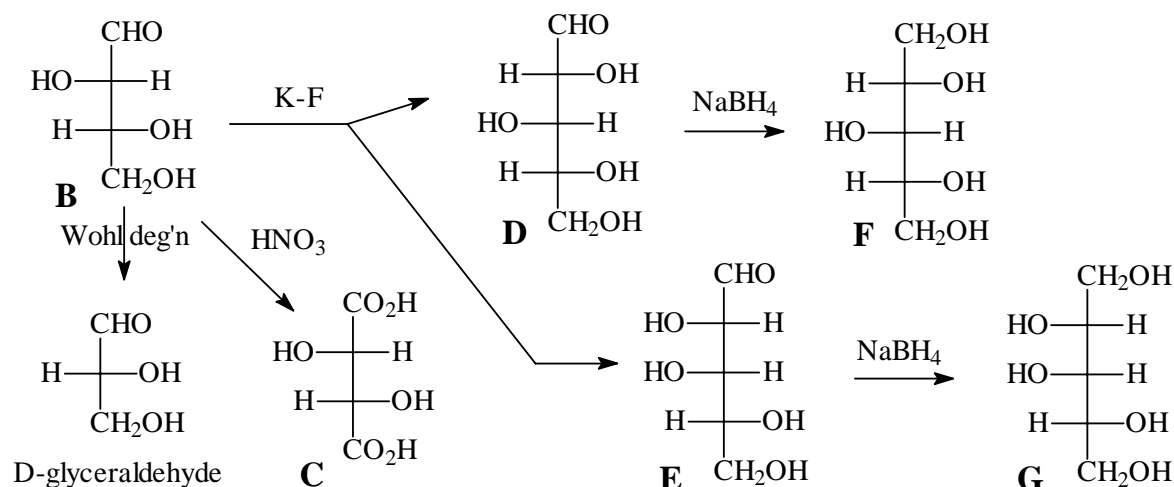
*pyrimidine*

*benzimidazole*

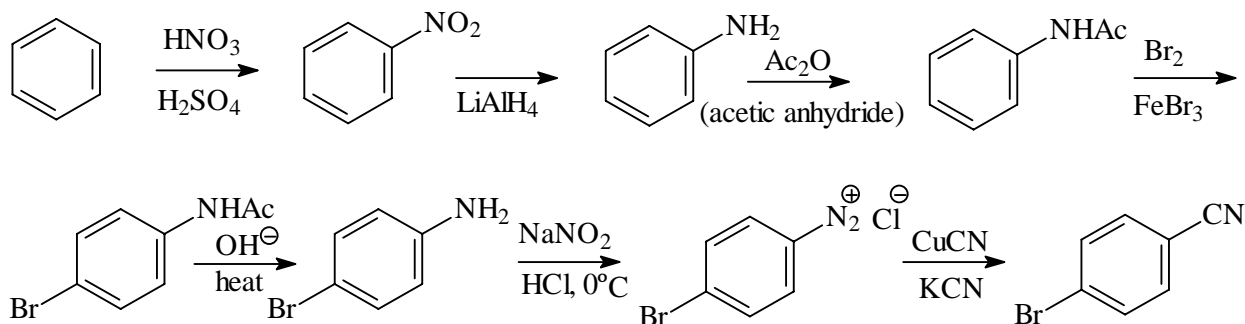
3. (2) Circle the strongest base and underline the weakest base among the following:



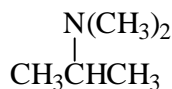
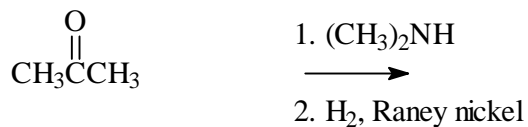
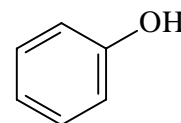
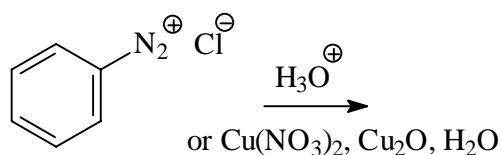
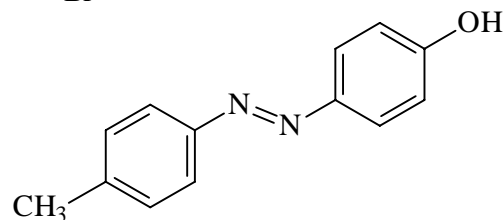
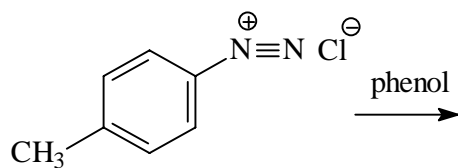
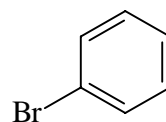
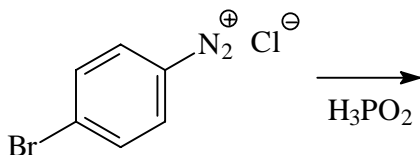
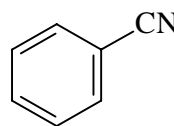
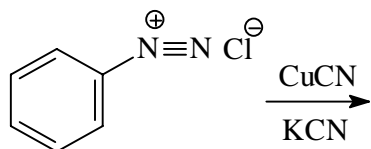
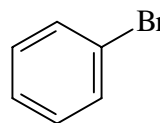
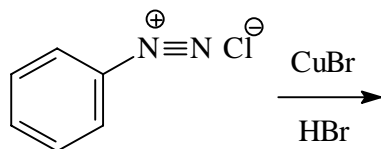
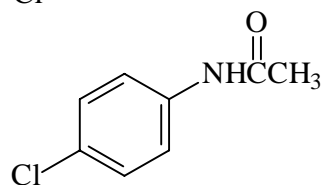
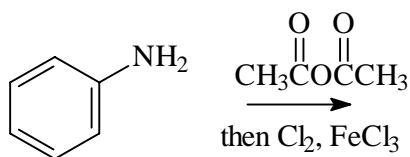
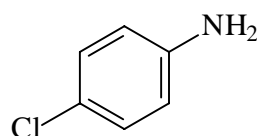
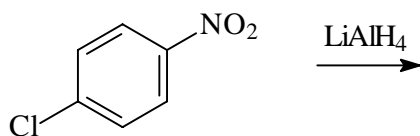
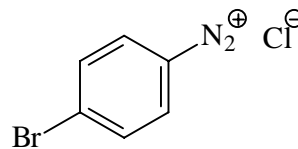
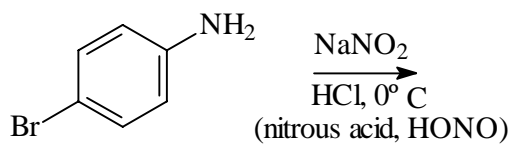
4. (6) Unknown aldotetrose **B** gives D-glyceraldehyde upon Wohl degradation. Nitric acid oxidation of **B** gives an optically active aldaric acid **C**. Application of the Kiliani-Fischer synthesis to **B** gives two products, **D** and **E**. Reduction of **D** with  $\text{NaBH}_4$  gives an optically inactive alditol **F**;  $\text{NaBH}_4$  reduction of **E** gives an optically active alditol **G**. Draw correct Fischer projections for **B**, **C**, **D**, **E**, **F** and **G**.



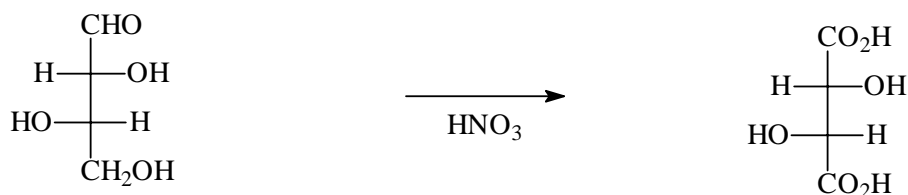
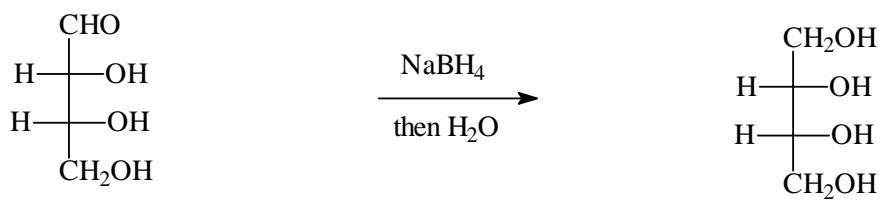
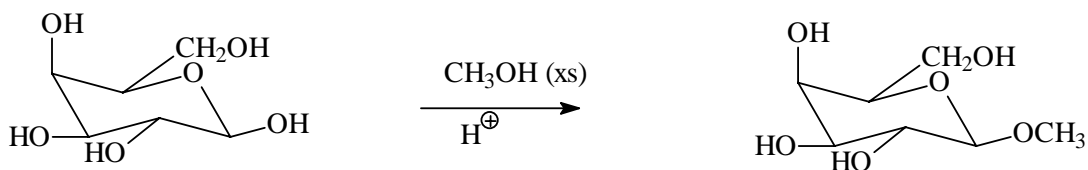
5. (4) Devise a step-by-step synthesis of 4-bromobenzonitrile, starting with benzene and using a diazonium salt intermediate. Show all reagents needed for each step.



6. (18) Draw the structure of the major organic product of each of the following:



7. (6) Draw the structure of the major organic product of each of the following:



8. (4) Circle each optically INACTIVE structure below:

