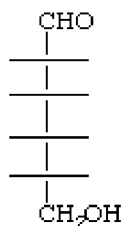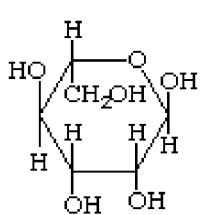# THIRD HOUR EXAM - CHEMISTRY 3331

APRIL 23, 1998

Problem 1. (5 points) For the following reactions, indicate to which side the equilibrium lies by circling the predominate species.

A) $CH_3CH_2^- Na^+ + NH_3 \rightleftharpoons CH_3CH_3 + Na^+NH_2^-$

B) $HO^- + CH_3NH_3^+ \rightleftharpoons H_2O + CH_3NH_2$

C) $H_3C-\overset{\overset{O}{\|}}{C}-CH_3 + Na^+H_2\overset{\overset{O}{\|}}{C}-\overset{}{C}-OCH_3 \rightleftharpoons H_3C-\overset{\overset{O}{\|}}{C}-\overset{-}{C}H_2 Na^+ + H_3C-\overset{\overset{O}{\|}}{C}-OCH_3$

D) $H_3C-\overset{\overset{O}{\|}}{C}-O^-Na^+ + HCl \rightleftharpoons H_3C-\overset{\overset{O}{\|}}{C}-OH + NaCl$

E) $H_3C-\overset{\overset{O}{\|}}{C}-\underset{Na^+}{\overset{-}{C}H}-\overset{\overset{O}{\|}}{C}-CH_3 + H_2O \rightleftharpoons H_3C-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 + NaOH$
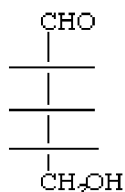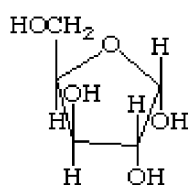
Problem 2. (10 points) For the following Haworth formulas, give the corresponding Fischer projections for the acyclic form of the sugar. Use the diagrams provided for the Fischer projection. Indicate if the the sugar is D or L.
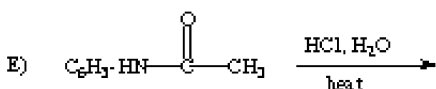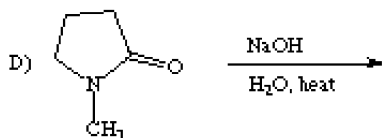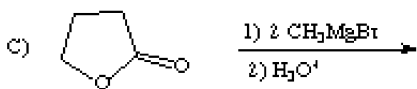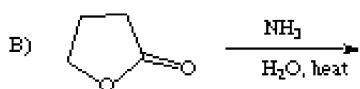

Problem 3. (20 points) Give the all of the products (not just the organic portion) for the following reactions. Be sure to give the correct state of protonation for the products.

A) CH_3CN $\xrightarrow[\text{H}_2\text{O, heat}]{\text{NaOH}}$

B) $\xrightarrow[\text{H}_2\text{O, heat}]{\text{NH}_3}$

C) $\xrightarrow[\text{2) H}_3\text{O}^+]{\text{1) 2 CH}_3\text{MgBr}}$

D) $\xrightarrow[\text{H}_2\text{O, heat}]{\text{NaOH}}$

E) $C_6H_5\text{-HN}\overset{\overset{\text{O}}{\|}}{-}C-CH_3$ $\xrightarrow[\text{heat}]{\text{HCl, H}_2\text{O}}$
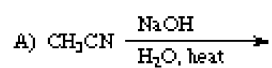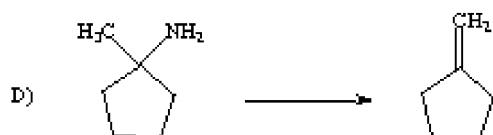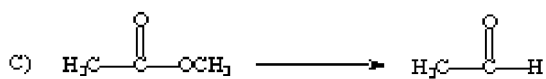
Problem 4. (10 points) How would you carry out the following transformation?
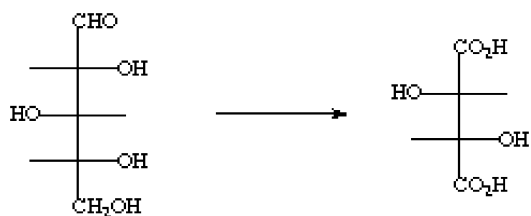
Problem 5. (40 points) What reagents would you use to carry out the following transformations? Do not use more than two steps for the transformation. Circle your answer

A) $H_3C-\underset{\underset{O}{\parallel}}{C}-Cl \longrightarrow CH_3-CH_2OH$

B) $CH_3-CN \longrightarrow H_3C-\underset{\underset{O}{\parallel}}{C}-CH_3$

C) $H_3C-\underset{\underset{O}{\parallel}}{C}-OCH_3 \longrightarrow H_3C-\underset{\underset{O}{\parallel}}{C}-H$

D)

E) $CH_3-CN \longrightarrow CH_3-CH_2-NH_2$

F) $H_3C-\underset{\underset{O}{\parallel}}{C}-Cl \longrightarrow H_3C-\underset{\underset{O}{\parallel}}{C}-CH_3$

G)

H)
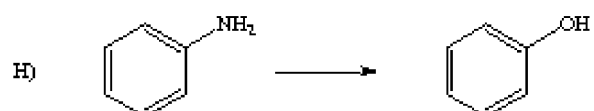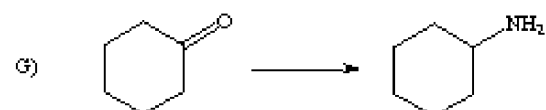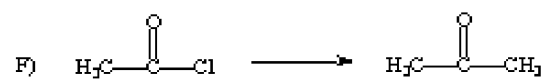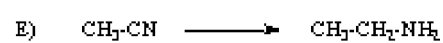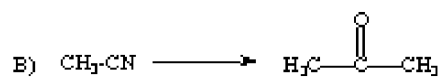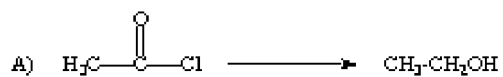
Problem 6. (15 points) How would you carry out the following synthesis using the indicated starting material and any other organic or inorganic reagents?