

Organic Chemistry  
Aldehydes and Ketones  
Practice Set

1. (18.1) Neglecting enantiomerism, give structural formulas, common names, and IUPAC names for:
  - a. The seven carbonyl compounds of  $C_5H_{10}O$
  - b. The five carbonyl compounds of formula  $C_8H_8O$  that contain a benzene ring
  
2. (18.2) Draw structural formulas of:
  - a. acetone
  - b. benzaldehyde
  - c. isobutyl methyl ketone
  - d. trimethylacetaldehyde
  - e. acetophenone
  - f. 4-methylpentanal
  - g. Phenylacetaldehyde
  - h. Benzophenone
  - i.  $\alpha, \gamma$ -dimethylcaproaldehyde
  - j. 3-methyl-2-pentanone
  - k. 2-butenal
  - l. 4-methyl-3-penten-2-one
  - m. 1,3-diphenyl-2-propen-1-one
  - n. 3-hydroxypentanal
  - o. benzyl phenyl ketone
  - p. *p,p'*-dihydroxybenzophenone
  - q. *m*-tolualdehyde
  
3. (18.3) Write balanced equations, naming all organic products, for the reaction (if any) of phenylacetaldehyde with:
  - a. Tollens' reagent
  - b.  $CrO_3/H_2SO_4$
  - c. Cold, dilute  $KMnO_4$
  - d.  $KMnO_4, H^+, \text{heat}$
  - e.  $H_2, Ni, 20 \text{ lb/in}^2, 30 \text{ }^\circ C$
  - f.  $LiAlH_4$
  - g.  $NaBH_4$
  - h.  $C_6H_5MgBr$ , then  $H_2O$
  - i. isopropylmagnesium chloride, then  $H_2O$
  - j.  $HC\equiv CLi$ , then  $H_2O$
  - k.  $CN^-, H^+$
  - l. hydroxylamine
  - m. phenylhydrazine
  - n. 2,4-dinitrophenylhydrazine
  - o. semicarbazide
  - p. ethyl alcohol, dry  $HCl(g)$
  
4. (18.7) Write equations for all steps in the synthesis of the following from propionaldehyde, using any other needed reagents:
  - a. *n*-propyl alcohol
  - b. propionic acid
  - c.  $\alpha$ -hydroxybutyric acid
  - d. *sec*-butyl alcohol
  - e. 1-phenyl-2-propanol
  - f. ethyl methyl ketone
  - g. 2-methyl-3-pentanol
  
5. (18.9) Outline all steps in the laboratory synthesis of the following compounds from benzene, toluene, and alcohols of four carbons or fewer, using any needed inorganic reagents:
  - a. isobutyraldehyde
  - b. phenylacetaldehyde
  - c. *p*-bromobenzaldehyde
  - i. *m*-nitrobenzophenone
  - j. *n*-propyl *p*-tolyl ketone
  - k.  $\alpha$ -methylbutyraldehyde

- d. ethyl methyl ketone
- e. 2,4-dinitrobenzaldehyde
- f. *p*-nitrobenzophenone
- g. 2-methyl-3-pentanone
- h. benzyl methyl ketone
- i. *n*-butyl isobutyl ketone
- m. *p*-nitroacetophenone
- n. 3-nitro-4'-methylbenzophenone
- o. *p*-nitropropiofenone
- p. 2-phenyl-2-propanol