

Organic Chemistry
Cyclic Aliphatic Compounds
Practice Set

- 1) (13.1) Draw structural formulas of:
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| a) Methylcyclopentane | f. cyclohexylcyclohexane |
| b) 1-methylcyclohexene | g. cyclopentylacetylene |
| c) 3-methylcyclopentene | h. 4-chloro-1,1-dimethylcycloheptane |
| d) <i>trans</i> -1,3-dichlorocyclobutane | i. bicyclo[2,2,1]hepta-2,5-diene |
| e) <i>cis</i> -1-bromo-2methylcyclopentane | j. 1-chlorobicyclo[2,2,2]octane |
- 2) (13.2) Give structures and names of the principal organic products expected from each of the following reactions:
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| a. cyclopropane + Cl ₂ , FeCl ₃ | o. cyclopentene + cold KMnO ₄ |
| b. cyclopropane + Cl ₂ (300.°C) | p. cyclopentene + HCO ₂ OH |
| c. cyclopropane + conc. H ₂ SO ₄ | r. cyclopentene + hot KMnO ₄ |
| d. cyclopentane + Cl ₂ , FeCl ₃ | s. cyclopentene + NBS |
| e. cyclopentane + Cl ₂ (300. °C) | t. 3-bromocyclopentene + KOH (hot) |
| f. cyclopentane + conc. H ₂ SO ₄ | u. 1,4-cyclohexanediol + H ₂ SO ₄ |
| g. cyclopentene + Br ₂ /CCl ₄ | v. cyclohexene + H ₂ SO ₄ → C ₁₂ H ₂₀ |
| h. cyclopentene + Br ₂ (300. °C) | w. cyclopentene + CHCl ₃ + <i>t</i> -BuOK |
| i. 1-methylcyclohexene + HCl | x. cyclopentene + CH ₂ I ₂ + Zn(Cu) |
| j. 1- methylcyclohexene + Br ₂ (aq) | y. chlorocyclopentane + (C ₂ H ₅) ₂ CuLi |
| k. 1-methylcyclohexene + HBr (peroxides) | |
| l. 1,3-cyclohexadiene + HCl | |
| m. cyclopentanol + H ₂ SO ₄ (heat) | |
| n. bromocyclohexane + KOH(alc) | |
| z. 1-methylcyclopentene + cold conc. H ₂ SO ₄ | |
| aa. 3-methylcyclopentene + O ₃ , then H ₂ O/Zn | |
| bb. 1-methylcyclohexene + (BH ₃) ₂ ; H ₂ O, OH ⁻ | |
| cc. 1-methylcyclohexene + Hg(OAc) ₂ , H ₂ O;NaBH ₄ | |
- 3) Outline all steps in the laboratory synthesis of each of the following from cyclohexanol.
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| a) cyclohexene | g. adipic acid, HOOC(CH ₂) ₄ COOH |
| b) cyclohexane | h. bromocyclohexane |
| c) <i>trans</i> -1,2-dibromocyclohexane | i. 2-chlorocyclohexanol |
| d) <i>cis</i> -1,2 cyclohexanediol | j. 3-bromocyclohexene |
| e) <i>trans</i> -1,2-cyclohexanediol | k. 1,3cyclohexadiene |
| f) OHC(CH ₂) ₄ CHO | l. cyclohexylcyclohexane |
| m. <i>norcarane</i> , bicyclo[4.1.0]heptane | |