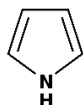


Organic Chemistry  
Aromaticity  
Practice Set

1. (14.1) Draw structural formulas of:
  - a. *p*-dinitrobenzene
  - b. *m*-bromonitrobenzene
  - c. *o*-chlorobenzoic acid
  - d. *m*-nitrotoluene
  - e. *p*-bromoaniline
  - f. *m*-iodophenol
  - g. mesitylene (1,3,5-trimethylbenzene)
  - h. 3,5-dinitrobenzenesulfonic acid
  - i. 4-chloro-2,3-dinitrotoluene
  - j. 2-amino-5-bromo-3-nitrobenzoic acid
  - k. *p*-hydroxybenzoic acid
  - l. 2,4,6-trinitrophenol
  
2. (14.4) Give structures and names of all theoretically possible products of the ring mononitration of:
  - a. *o*-dichlorobenzene
  - b. *m*-dichlorobenzene
  - c. *p*-dichlorobenzene
  - d. *o*-bromochlorobenzene
  - e. *m*-bromochlorobenzene
  - f. *p*-bromochlorobenzene
  - g. *o*-chloronitrobenzene
  - h. *m*-chloronitrobenzene
  - i. *p*-chloronitrobenzene
  - j. 1,3,5-trimethylbenzene
  - k. 4-bromo-1,2-dimethylbenzene
  - l. *p*-ethyltoluene
  
3. (14.6) Give structures and names of all benzene derivatives that *theoretically* can have the indicated number of isomeric ring-substituted derivatives.
  - a. C<sub>8</sub>H<sub>10</sub>: one monobromo derivative
  - b. C<sub>8</sub>H<sub>10</sub>: two monobromo derivatives
  - c. C<sub>8</sub>H<sub>10</sub>: three monobromo derivatives
  - d. C<sub>9</sub>H<sub>12</sub>: one monobromo derivative
  - e. C<sub>9</sub>H<sub>12</sub>: two monobromo derivatives
  - f. C<sub>9</sub>H<sub>12</sub>: three monobromo derivatives
  - g. C<sub>9</sub>H<sub>12</sub>: four monobromo derivatives
  
4. (14.10) The properties of *pyrrole*, commonly represented as:



Show that it is aromatic. Account for its aromaticity on the basis of orbital theory. (Hint: see sec. 14.10 and check your answer in sec. 30.2 of the 6<sup>th</sup> edition of *Organic Chemistry* by Morrison and Boyd.)