

Chemistry 125 Third Examination  
November 11, 2005

Name \_\_\_\_\_

The exam budgets 50 minutes, but you may have 60 minutes to finish it. Good answers can fit in the space provided.

- 1.** (4 min) Give succinct definitions for each of the following terms:  
“constitutional isomers”

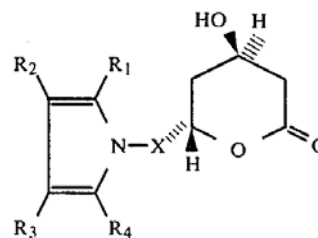
“diastereomers”

- 2.** (6 min) Good theory rationalizes existing observation and makes testable predictions of new observations.  
Give a specific example of each for van't Hoff's theory of stereochemistry. (TWO EXAMPLES altogether)

- 3.** (3 min) How did Kekule show that the methyl groups in “mesitylene” must be in the 1, 3, and 5 positions?

4. (4 min) How did Koerner demonstrate that the position of OH in hydroxybenzoic acid is equivalent to that of COOH?
5. (3 min) What did A.S. Couper find philosophically objectionable about the contemporary radical theory.
6. (6 min) Use curved arrows to show the several steps for **ONE** (one only) of the following transformations:  
(a) addition of  $\text{NH}_3$  to  $\text{HN}=\text{C}=\text{O}$  to give urea; **or** (b) conversion of  $\text{CH}_4$  to  $\text{CH}_3\text{Cl}$ ; **or** (c) addition of  $\text{Cl}_2$  to  $\text{CH}_2=\text{CH}_2$ .

7. (5 min) How did the following structure create patent problems for Pfizer?

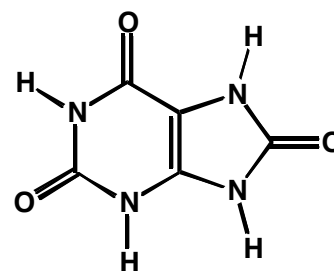


8. (2 min) Name compounds that could be used to illustrate the Law of Multiple Proportions. (**just names**, no discussion necessary)

9. (5 min) What did this device contribute to chemistry?  
Mention BOTH EXPERIMENT and ORGANIC THEORY.



10. (4.5 min) Use **orbitals** to explain why uric acid behaves as an acid, even though it has no COOH group.



- 11.** (7.5 min) Berzelius, Fischer, Lavoisier, Pasteur, and Scheele (alphabetical) each used **tartaric acid** to advance organic chemistry. Describe their five contributions with tartaric acid briefly near the proper place on this timeline:

1750

1775

1800

1825

1850

1875

1900

1925