

Chemistry 11 Spring 2008 Exam 4. 60 points. Be sure to use as much detail as possible as you answer the following questions.

10 points. Write Lewis structures for the following molecules and ions:

OCS

CN⁻

C₂H₆

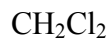
10 points. Draw two resonance structures for OCN⁻. Show formal charges for each atom in each structure.

5 points. Write a Lewis structure for SeF₆. Discuss the issue of the octet rule with this compound.

5 points. For the reaction $\text{CH}_4 (\text{g}) + 2\text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + 2\text{H}_2\text{O} (\text{g})$

Predict the enthalpy of reaction from bond enthalpy values.

10 points. Predict the geometries of the following species using the VSEPR method. Include angles and the name of the geometry in your response.



5 points. Describe the hybridization state of each carbon atom in $\text{CH}_2=\text{CH}_2$?

5 points. Describe the hybridization of sulfur in SF₆.

10 points. Consider the following species: C₂⁺, C₂, and C₂⁻

- A. Use molecular orbital energy diagrams to discuss the relative stability of these three species.
- B. Which species would be expected to be most stable?
- C. Which would have the strongest bond?
- D. Shortest bond?
- E. Which of these species are paramagnetic?

Your responses will be scored based on the detail with which you use to answer the questions.