

Chemistry 210 -- EXAM 1 (Fall 2000 - Dr. Robertson)

****** BEFORE BEGINNING EXAM, PLEASE READ THE FOLLOWING ******

The exam consists of this cover sheet, 23 multiple-choice questions (worth 69 points), and 5 regular problems. An extra credit problem is optional. The time limit for this exam is *2 hours* (if more time is needed, you will be moved to the lab).

Please read problems carefully so that you understand the entire problem. No work = no credit.

Signed _____

24 (6) Draw a Lewis structure for H_2SO_4 , making all formal charges equal to zero (H atoms are bonded to O atoms). What is the orbital hybridization for the central sulfur atom?

25 (5) Draw the Lewis structure for ozone (O_3). Then, show one resonance structure. Based on the observation that single bonds between the same atoms are longer than double bonds, explain why ozone actually has bond lengths the same, even though the Lewis structures might imply otherwise.

26 (8) Draw structures (3 pts) and give IUPAC names (3 pts) for the three constitutional isomers of C_5H_{12} . Predict the relative boiling points, from lowest to the highest, for each of these compounds (2 pts).

27 (4) Draw the *cis* and *trans* isomers of 1,2-dimethylcyclopropane (2 pts). Which is more stable, and justify your answer (1 pt)? Explain how combustion can be used to show which isomer is the most stable (1 pt).

29 (8) Show structure for each of the following alkyl groups, which can be attached to hydrocarbon chains. Be sure to show where attachment occurs from these alkyl groups.

Isopropyl

Tert-butyl

Isopentyl

Sec-butyl

Cyclohexyl

Octyl

EXTRA CREDIT (4 points): Please show structures for the following compounds, which have been used in the lab or described during lecture.

Benzoic acid

Diethyl ether

Ethyl alcohol

6-(1-methylpentyl)-5-propyldodecane