

Chemistry 125 Third Examination
November 14, 2007

Name _____

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

Question values correspond to allotted time. Don't waste too much time on cheap questions.

Read each question carefully to see what it asks for (bold face is used to help highlight questions).

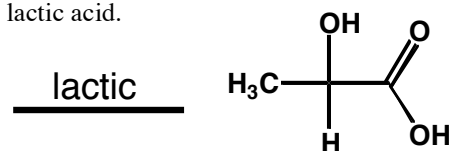
Make sure you are answering the question, not just saying something vaguely relevant to its topic.

1. A single 18th Century chemist discovered all of the acids shown below. The first is lactic acid.

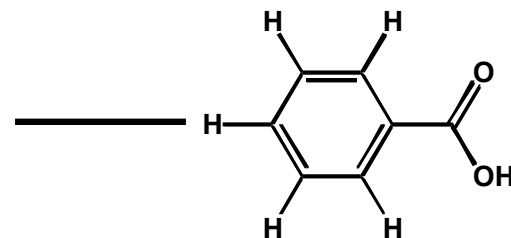
A) (2.5 min) Fill in **names** for the **other three acids**,

and for the **chemist** : _____

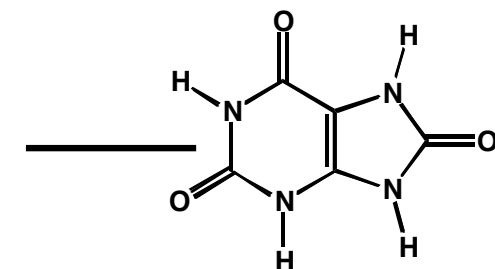
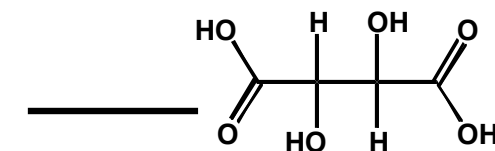
and his **country** : _____



B) (1.5 min) What did the discoverer find interesting about **one** (ONE ONLY) of the following salts of lactic acid? Lead *or* Zinc

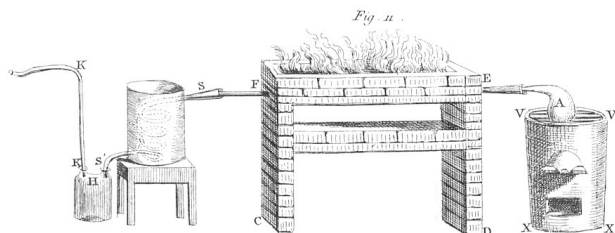
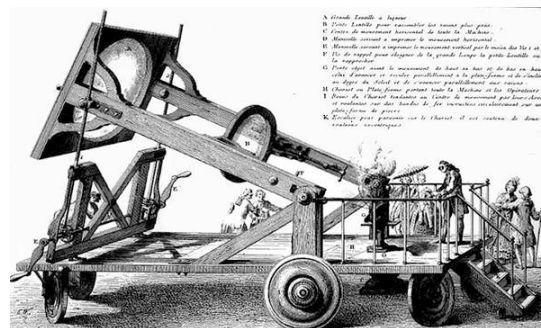


C) (6 min) Use the language of **molecular orbitals** and their energies to explain the acidity of the acid that does **not** contain a carboxylic acid group.



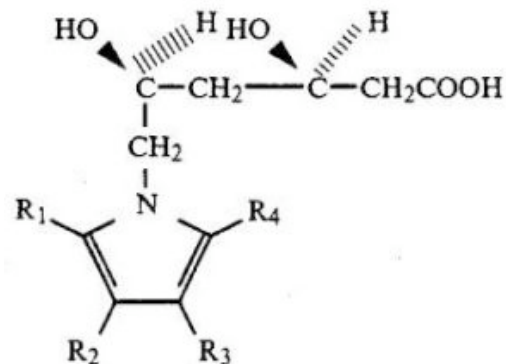
D) (10 min) Choose **ONE** of these carboxylic acids, explain briefly how it played an important role in **two different subsequent contributions** to the development of organic chemistry. **Date** the two contributions within 10 years.
(Continue your answer on the back of this page)

2. (5 min) Explain how **one** of the following pieces of equipment was used to help prepare an element from a compound.



3. (4 min) **Explain why** we have **two** names, butyl bromide and bromobutane, to describe the same compound and why one name has a **space**, but not the other.

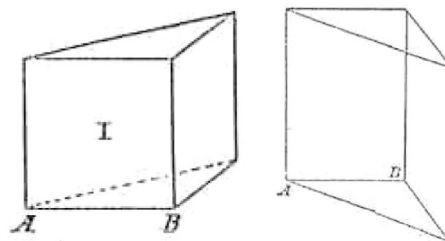
4. A) (2 min) Criticize the drawing of this structure (from an important U.S. Patent):



- B) (4 min) **Label** the substituents on the **rightmost** stereogenic carbon with appropriate CIP priority numbers (1-4), and **give the symbol** to designate its absolute configuration.

- C) (3 min) If the ring containing a nitrogen atom were replaced by a COOH group to make the molecule symmetrical, would the resulting compound be **chiral or meso**? Explain your choice in a few words.

5. (4 min) One of the figures is from a paper by van't Hoff, the other from a paper by Ladenburg. Explain in terms of their thinking how you can tell which is which.



6. (8 minutes) Cite enough of the evidence Koerner used for proving the equivalence of the six substituent positions in benzene to **explain** why benzene cannot have the pentagonal pyramid structure shown below. (Ignore the possible inequivalence of enantiomers, which did not enter his thinking. Feel free to incorporate some or all of the repeated structures in your answer.)

