Chemistry 204: Quiz #9

1. Which of the following is expected to have the **highest** vapor pressure (all at the same temperature)?

   a) butane
   b) formic acid (also called methanoic acid)
   c) 2-propanol (also called isopropyl alcohol)
   d) acetone (also called propanone)
   e) water

2. The substance with the formula $H_2CCHCH_2N(CH_3)_2$ is

   a) An alkene and a secondary amine.
   b) An alkane and a tertiary amine.
   c) An alkene and a tertiary amine.
   d) An alkyne and a primary amine.
   e) An alkane and a secondary amine.

3. You are visiting a friend at another university and sitting in on a chemistry lecture. The instructor writes "2,3-dimethyl-2,3-diethylpropane" on the board. What should you say to this person?

   a) "Actually, the name is 1,2-dimethyl-1,2-diethylpropane"
   b) "Actually, the name is 3,4,4-trimethylhexane."
   c) "Actually, the name is 3,4-dimethylheptane."
   d) "Actually, the name is 3,3,4-trimethylhexane."
   e) "Actually, the name is 2,3-dimethyl-2-ethylpentane."

4. How many of the following require a number in the name in order to correctly identify it?

   I. chloropropane
   II. propanone
   III. propene
   IV. propanoic acid

   a) 0 b) 1 c) 2 d) 3 e) 4

5. You wish to synthesize methyl ethanoate. Which of the following should be your staring materials?

   a) ethanoic acid and methanol
   b) methanoic acid and ethanol
   c) ethanal and methanal
   d) methanoic acid and ethane
   e) ethanoic acid and methane

Chemistry 204: Quiz #9

6. Consider the following alcohols and amine. How many of them are "secondary"?

   I. 2-methyl-2-butanol
   II. 2,2-dimethyl-1-butanol
   III. 2-methyl-2-propanol
   IV. ethylmethylamine

   a) 0 b) 1 c) 2 d) 3 e) 4

7. For which of the following molecules is the oxidation state of carbon closest to zero; that is, the absolute value of the oxidation state is the smallest?

   a) propane
   b) ethyl methyl ether
   c) 2-propanol
   d) propanal
   e) propanoic acid

8. In lecture I did a demonstration showing that water does not mix well with what I called hexane. It turns out that when you purchase "hexane" you can do so less expensively by purchasing what is called "hexanes," which is a mixture of hexane isomers. Answer the following questions concerning hexane isomers and their derivatives.

   a. **Write the names of all the hexane isomers**. Do not include their structures (you probably should draw these on scratch paper, but that is up to you) – just list the names (legibly, please) on the lines below. You have been given at least as many lines as you need (you may not need all of them – that is for you to decide).

   b. Now consider what happen when you brominate the hexanes (that is, you replace at least one of the hydrogen atoms with a bromine atom). In answering these questions, the same isomer from part a may be used once, twice, or all three times and, like in part a, you have been given at least as many lines as you need.

      i. When replacing one hydrogen atom with one bromine atom, which hexane isomer from part a has the **fewest** isomers? Name the mono-brominated isomers.

      ii. When replacing two hydrogen atoms with two bromine atoms, which hexane isomer from part a has the **fewest** isomers? **Note: only consider those isomers for which the bromine atoms are bonded to the carbon atoms in the longest carbon chain.** Name the di-brominated isomers.

      iii. When replacing three hydrogen atoms with three bromine atoms, which hexane isomer from part a has the **fewest** isomers? **Note: only consider those isomers for which the bromine atoms are bonded to the carbon atoms in the longest carbon chain.** Name the tri-brominated isomers.

Chemistry 204: Quiz #9

==========

KEY:

MC: 1. a, 2. c, 3. d, 4. b, 5. a, 6. b, 7. e

8. a. Hexane; 2,3-dimethylbutane; 2,2-dimethylbutane; 2-methylpentane; 3-methylpentane

   b. i. 2,3-dimethylbutane; 1-bromo-2,3-dimethylbutane, 2-bromo-2,3-dimethylbutane

   b. ii. 2,3-dimethylbutane; 1,1-dibromo-2,3-dimethylbutane, 1,2-dibromo-2,3-dimethylbutane, 1,3-dibromo-2,3-dimethylbutane, 1,4-dibromo-2,3-dimethylbutane, 2,3-dibromo-2,3-dimethylbutane

   b. iii. 2,3-dimethylbutane; 1,1,1-tribromo-2,3-dimethylbutane, 1,1,2-tribromo-2,3-dimethylbutane, 1,1,3-tribromo-2,3-dimethylbutane, 1,1,4-tribromo-2,3-dimethylbutane, 1,2,3-tribromo-2,3-dimethylbutane, 1,2,4-tribromo-2,3-dimethylbutane