

Chemistry 100

Study Guide for Exam 2 (Friday, October 10th)

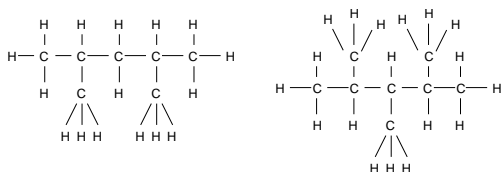
The main topics to study for the exam, along with some previous exam questions are provided below.

Chapter 3

- molecular shape: distinguish between tetrahedral, pyramidal, trigonal planar, bent and linear
- explain why carbon is able to form such a wide variety of compounds
- distinguish between alkanes, alkenes and alkynes
- identify structural isomers
- draw and interpret line structures for organic compounds
- know the terms saturated, unsaturated, monounsaturated, polyunsaturated in reference to hydrocarbons

Sample questions, Chapter 3

1. What is the shape of the molecule CHCl_3 ?
2. What is the shape of the molecule NH_2Cl ?
3. What is the shape of the molecule HCN ?
4. There are 5 different structural isomers of hexane, C_6H_{14} . Draw any two of them.
5. Are the following compounds isomers, identical, or neither?



6. Draw line structures of the above hydrocarbons.
7. Identify two reasons carbon is unique and is able to form such a wide variety of compounds
8. Give an example of an unsaturated hydrocarbon.

Chapter 4

- polyatomic ions: know formulas for hydroxide, nitrate, sulfate, carbonate, ammonium and bicarbonate.
- Write formulas for compounds containing the above ions.
- Name simple ionic compounds containing the polyatomic ions above.
- solution concentrations
- be familiar with the definition of acids and bases
- be able to write a chemical equation for an acid being dissolved in water (an acid dissociation equation)
- be able to write the chemical equation for neutralization reactions
- strong and weak acids and bases - definitions
- pH scale, $[\text{H}^+]$ and $[\text{OH}^-]$ concentrations

Sample questions, Chapter 4

- Write the chemical formulas for:
 - barium sulfate
 - potassium nitrate
 - ammonium chloride
 - sodium bicarbonate
 - calcium carbonate
 - lithium hydroxide
- Name the compound NH_4NO_3 .
- Name the compound K_2CO_3 .
- What is the molarity of a solution made from 0.25 moles of glucose and enough water to make 500 mL of solution?
- How many grams of KBr do I need to make 100 mL of a 2M solution?
- If I mix 40 ml of isopropanol with enough water to make 250 mL of solution, what is my concentration in v/v%?
- Write a chemical equation for what happens when the acid HCl dissolves in water. (an acid dissociation equation).
- A solution has a pH of 9.0. Which one of the following is true:
 - The solution has more H_3O^+ ions than it has OH^- ions.
 - The solution has the same amount of H_3O^+ ions as it has OH^- ions.
 - The solution has fewer H_3O^+ ions than it has OH^- ions.
 - We cannot say anything about the relative amounts of H_3O^+ ions and OH^- ions.
- Describe the difference between a strong and a weak acid.
- A substance tastes sour. Is this substance likely an acid or a base?
- Write the balanced chemical equation for the neutralization reaction between sodium hydroxide, NaOH (a base) with hydrobromic acid, HBr.
- Consider a solution of pH = 3.2. Is this solution acidic or basic?
- What is the pH of a solution with an H_3O^+ concentration of 1.0×10^{-8} M? Is this solution acidic or basic?
- What is the OH^- concentration of a solution with an H_3O^+ concentration of 7.4×10^{-6} M?
- What is the pH of a solution with an OH^- concentration of 5.2×10^{-4} M? Is this solution acidic or basic?

Air Pollution/Acid Rain - Chapter 4 and Notes from 10/1-10/6

- structure/composition of atmosphere
- incomplete combustion and CO, hydrocarbon fragment production
- primary components of photochemical smog
- controlling SO_2 emissions from power plants
- primary causes of acid rain
- effects of acid rain

Sample questions, Air Pollution/Acid Rain

1. What are the two primary components of our atmosphere?
2. Describe the two primary causes of acid rain discussed in class. Include the sources and chemical formulas of original (primary) pollutants.
3. What is incomplete combustion and how is it relevant to pollution from automobile exhaust?
4. What are the three things needed for photochemical smog formation?
5. Describe the effect of acid rain and on aquatic environments, such as lakes and streams.
6. Describe (in one or more complete sentences) 1 potential negative effect of acid rain, other than its effect on aquatic environments.
7. What are the primary advantages and disadvantages of switching to lower-sulfur coal to reduce emissions that lead to acid rain?
8. Besides switching to lower sulfur coal, describe one of the remaining primary methods for reducing acid-rain producing emissions by coal power plants and mention the method's primary disadvantage.

Chapter 5

- electron configuration
- noble gas notation
- shells, subshells, orbitals

Sample questions, Chapter 5

1. How many electrons are in the outer most shell of neon (Ne)?
2. What is the maximum number of electrons allowed in a p subshell?
3. Write out the full electron configuration of zirconium (Zr), with **and** without using the noble gas notation.
4. Write out the full electron configuration of boron (B), with **and** without using the noble gas notation.