

Chemistry Semester 2 Final Exam Study Guide

Name _____

- ✓ The final exam will be multiple-choice and short answer. Come prepared with a pencil.
- ✓ Do not bring electronic devices to the exam (**other than a calculator**). This includes cell phones and mp3 players. If I see them I will take them.
- ✓ There will be no rest room passes.
- ✓ I will provide a laminated periodic table.
- ✓ **BRING A PENCIL AND A CALCULATOR!!!** Don't come to my final without these.
- ✓ The Chemistry Final Exam will count for 12% of your final semester grade. The exam will cover material from second semester. Some questions will require you to know material from first semester. Complete this review sheet on a separate sheet of paper. This review sheet covers all of the topics covered on the final exam. Use old worksheets, labs, and the class website (Unit 6-9) for extra practice problems.
- ✓ A Hint Sheet can be made.
 - Criteria for the hint sheet
 - Full sheet of standard 8.5"x11" typing paper (or lined notebook paper)
 - You may write on one side of the paper.
 - You can write whatever you want!
 - It **MUST** be in your *own handwriting*. **No** typed Hint Sheets.
 - Due the day of the final. It will be turned in...

Final exam topics:

1. Formulas and nomenclature (unit 6)
2. Chemical Reactions + Balancing + Energy (unit 7)
3. Stoichiometry (unit 8)
4. Molarity and Solubility (unit 9)
5. Acids and Bases (unit 10)

"Success is a state of mind. If you want success, start thinking of yourself as a success."

- ✓ Keys to success:
 - Complete this study guide.
 - Don't wait until the day before finals to get help.
 - Start studying early. Remember, you have all summer to relax.
 - Be prepared.

Formulas and Nomenclature (Unit 6)

You must know how to write a chemical formula and name, both ionic and covalent. The organizers below will help with the rules you must remember when writing a chemical name or formula.

IONIC COMPOUND NOMENCLATURE

Define binary compound and describe how to name them.	Describe how to write the formula for a binary ionic compound.	Describe how to write the formula of an ionic compound containing polyatomic ions.
Ex) sodium chloride, Lithium bromide, Magnesium bromide, Calcium chloride	Ex) NaCl, LiBr, MgBr ₂ , CaCl ₂	Ex) KCN, NaOH, NaNO ₃ , NH ₄ Cl, Ca ₃ (PO ₄) ₂

Describe how to name a compound containing a polyatomic ion.	Transition elements can have more than one charge. How do you name ionic compounds that contain transition elements?	How do you write the formula for ionic compounds that contain transition elements?
Ex) Potassium cyanide, Sodium hydroxide, Sodium nitrate, Ammonium chloride, Calcium phosphate	Ex) Iron (III) bicarbonate, Iron (II) chloride, Manganese (IV) oxide	Ex) Fe(HCO ₃) ₃ , FeCl ₂ , MnO ₂

COVALENT COMPOUND NOMENCLATURE

Complete the following graphic organizer by filling in each square with information that best explains the statement in each box.

What are physical and chemical properties of covalent compounds?	Define diatomic molecule, list the names of all 7, and list their formula
When naming covalent compounds, what rules should you follow? Ex) Nitrogen dioxide Dinitrogen monoxide	When writing the formula for covalent compounds, what rules should you follow? Ex) NO ₂ N ₂ O

Be able to define from unit 6: group, period, family, row, column, atomic weight (atomic mass), atomic number

Chemical Reactions (Unit 7)

- Know how to name compounds and write correct chemical formulas from names. (more examples)
 - calcium carbonate
 - tin (IV) phosphate
 - boron trichloride
 - aluminum sulfide
 - CCl_4
 - CaO
 - $\text{Be}(\text{NO}_3)_2$
 - Fe_2O_3
 - sodium bicarbonate (baking soda)
 - ammonium sulfate
 - sodium chloride
 - hydrogen
 - fluorine
 - iodine
- Write** the reaction products, **balance** the equation, and then **label** it with the reaction type. These are only a few examples.
 - methane (CH_4) gas plus oxygen gas
 - aluminum metal plus iron (II) oxide
 - sodium metal plus oxygen gas
 - electrolysis (decomposition) of water
 - nickel (II) nitrate plus potassium sulfide
- List four factors that can increase the rate of a reaction.
- Be able to identify the movement of energy in and out of a reaction and across different storage accounts. See worksheets for examples. (skip in '17), but be able to define and use endothermic and exothermic

Stoichiometry (Unit 8)

- Be able to calculate the molar mass of an element or compound. Here are some examples.
 - Mg
 - N_2
 - NaOH
 - $\text{Ca}(\text{NO}_3)_2$
- Be able to perform the following conversions between formula A and formula B using a balanced chemical equation (use your old worksheets here/website videos).
 - moles A \rightarrow grams A
 - grams A \rightarrow moles A
 - moles A \rightarrow moles B
 - moles A \rightarrow grams B
 - grams A \rightarrow grams B
 - grams A \rightarrow Liters B
 - Liters A \rightarrow grams B
 - Liters A \rightarrow liters B
- How many moles of water are produced when 0.23 mole of H_2 react with excess O_2 ?
Write the balanced chemical reaction first.
You will use this same equation for the next two questions
- How many grams of water are produced when 0.50 mole of O_2 reacts with H_2 ?
- How many grams of hydrogen gas are used when 16.2 grams of oxygen gas are used to produce H_2O ?
- Ammonia gas (NH_3) is produced by combining nitrogen and hydrogen gases at STP. If 5.55 L of nitrogen gas is available, calculate the number of liters of hydrogen gas that reacts. Write a balanced equation.
- When sodium metal is placed in a Petri dish of water it reacts violently releasing hydrogen gas and producing sodium hydroxide. Calculate the volume (in liters) of hydrogen gas produced at STP from 1.55g of sodium metal in water. Write a balanced chemical equation.

12. If you collected 0.7L of hydrogen gas during this experiment, what is your percent yield?
13. *Limiting Reactants:* A solution containing 5.0 g of silver nitrate was reacted with 5.0 g of potassium chloride. How much silver chloride will be made from 5.0 g silver nitrate? How much silver chloride will be made from 5.0 g of potassium chloride? Which of the two reactants is the limiting reagent? Write a balanced chemical equation for this double replacement reaction. What is the excess reactant and how much of it will be left over?

Aqueous Solutions and Molarity (Unit 9)

Be able to read a solubility curve and identify substances that are solids or gases, amount of solute at a certain temperature, and the temperature needed to dissolve an amount of solute. Make sure to reference your solubility curve worksheets and review a couple of questions from them.

Be able to complete molarity and dilution problems.

14. What happens to the solubility of a gas as temperature increases?
15. What is the molarity of a 250mL salt solution made with 5.0 g NaCl?
16. How many grams of NaOH are required to make 0.50 L of a 2.6M solution?
17. How much of a 2.0 M CuCl_2 solution will you need to make 250 mL of 0.1 M CuCl_2 ?
18. Distinguish between an unsaturated and saturated solution. What happens in each solution if more solute is added?

Acids and Bases (Unit 10)

1. List the general properties of acids and bases. (taste, examples, pH, feel, reactivity)
2. Write the formula and name of various acids and bases.
3. State the color of the following indicators in a solution of a given pH: phenolphthalein, methyl red, and bromthymol blue.
4. Neutralization reactions (predict products, and predict acid and base from the salt).