**Review Stuff For Final Exam – General, 2023-24 School Year**

The following is a general list of topics that will be covered during this year’s final exam, as well as a sample final exam that can give you an idea of the sorts of things I’ll ask. Before I go any further, here are a few things you need to keep in mind:

* This study guide will point you toward the information that you’ll need to know. Will it contain references to every single fact? No. However, it shouldn’t be too hard to guess what’s on the final from the information I give you here. For example, if I give you a question about how the kinetic molecular theory describes pressure, you shouldn’t be too surprised if I ask you how the KMT describes volume. If you read (not very deeply) between the lines, this sheet will give you an extraordinarily complete guide to what you need to know.
* The final exam will be primarily short answer as the quizzes and tests have been. There will be 10 matching questions, but that’s the only exception.
* How should you study for the final exam? Here are my suggestions:
  + Do the homework problems again. I love to recycle old homework questions.
  + Do the quiz problems again for the same reason.
  + Go over the PowerPoint presentations and make sure you understand them.
  + Look at the tutorials on my website ([www.chemfiesta.com](http://www.chemfiesta.com/)).
  + Do the practice problems on my website. Again, I like to recycle questions.
  + Look at my teacher website ([www.teachercav.com](http://www.teachercav.com/)). Though I don’t use any of the questions here directly, they are yet another good source of practice questions.
  + Read between the lines. If I ask you how to convert grams to moles on the review sheet, it’s probably not too surprising that I might also ask you to convert moles to grams.
  + Ask me for help. If you don’t understand anything, please come see me for help. I’m always happy to go over old material with you. And don’t feel stupid for not knowing something – it’s inherently smart to get help when you need it.
* Show your work! Ultimately, whether you get full credit on the final will depend on whether you give me the right answer. However, if you make a small mistake, or at least one that’s not disastrous, you can usually get some credit for a wrong answer. In some cases, you can get very nearly all of the credit if the mistake is trivial.
* Generally speaking, what will the final exam cover? Second semester, of course!

And with that, here are the main topics for the final exam:

* Bonding and structure in covalent compounds. This will require you to also have some understanding of the structure of ionic compounds so you can compare and contrast them.
* Lewis structures, including shapes, bond angles, and polarity.
* Moles and mole calculations: You should be able to convert between moles and grams. This will require you understand how to find molar mass.
* Balancing equations: Pretty straightforward – just know how to balance equations.
* Writing complete equations: You should be able to write equations from their descriptions using the five big criteria: Write the formulas, balance the equation, write the states of matter, write any needed reaction conditions around the arrow, and indicate whether the reaction is exothermic or endothermic.
* Types of reaction. Predicting reaction products and if reactions will occur at all.
* Kinetic molecular theory: What it’s for, what the postulates of the theory are, and how they affect the properties of gases. You should understand the shortcomings of the kinetic molecular theory with real gases.
* Going along with KMT, you should know what ideal gases are and how they behave. You should be aware that they don’t actually exist, but are stand-ins for real gases.
* You should be familiar with the combined and ideal gas laws, and be able to solve problems involving both of them.

This isn’t to say that I haven’t overlooked anything when writing this review sheet. I make mistakes, after all. However, after examining the final exam for this year and the material we’ve covered, it should be pretty complete.

Practice final exam: Keep in mind that these are *representative* examples of what you might expect to see, and cover the same material. The phrasing of the problems on the final may differ from this somewhat.

1. How many moles are there in 45 grams of CuSO4?
2. How many grams are there in 3.3 moles of Li2CO3?
3. Balance the following equations:
   1. \_\_\_\_ NaOH + \_\_\_\_ H3PO4 \_\_\_\_ H2O + \_\_\_\_ Na3PO4
   2. \_\_\_\_ S8 + \_\_\_\_ F2 \_\_\_\_ SF2
   3. \_\_\_\_ Ga(OH)3 + \_\_\_\_ H2SO4 → \_\_\_\_ Ga2(SO4)3 + \_\_\_\_ H2O
   4. \_\_\_\_ C6H12 + \_\_\_\_ O2 → \_\_\_\_ CO2 + \_\_\_\_ H2O
4. Will the reactions in problem 3 actually occur? If they do, indicate the type of reaction that’s taking place. If not, then write an X after them.
5. Write the complete equation for the following reaction: Dissolved carbonic acid (H2CO3) spontaneously breaks apart into carbon dioxide bubbles and liquid water at room temperature. The temperature of the solution decreases as the reaction progresses.
6. What is the volume of 1.50 moles of a gas at a temperature of 25o C when the pressure is 1.00 atm? R = 0.08206 L atm/mol K.
7. If I heat the gas from #6 to a temperature of 85o C, what will the volume of the gas be?
8. Write your own ideal gas law problem and write the solution.
9. Write your own combined gas law problem and write the solution.
10. List the postulates of the kinetic molecular theory and explain why they either are/aren’t reasonable. Be complete in your answer.
11. What is the single idea that underlies all of VSEPR theory? Explain.
12. Sulfur difluoride has the formula SF2. For this compound:
    1. Draw the Lewis structure
    2. Indicate the molecular shape
    3. Indicate the bond angles
    4. If the molecule is polar, draw a dipole arrow. If not, then don’t.
13. What is the main difference in bonding between ionic and covalent compounds?
14. What are the main properties of covalent compounds? What does each have to do with their molecular structure?
15. What is VSEPR? How can we use it to find the shapes of molecules.
16. \_\_\_\_ NaCl + \_\_\_\_ Pb(NO3)2 → \_\_\_\_ NaNO3 + \_\_\_\_ PbCl2
    1. Balance this equation.
    2. What type of reaction is this?
    3. Will this reaction occur?
    4. Assuming the reaction does occur, how many grams of lead(II) chloride can I make from 15 grams of NaCl and 40 grams of Pb(NO3)2?
    5. What was my limiting reagent from part d?
    6. How much of the excess reagent will remain after this reaction has taken place?
    7. If the actual yield of this reaction is 25 grams, what is my percent yield? Is this answer reasonable?
17. Define the following terms: Covalent bond, molecule, mole, stoichiometry, molar mass, polarity, VSEPR, pressure, temperature, volume, aqueous, solubility, single displacement reaction, double displacement reaction, synthesis, decomposition, acid-base reaction, combustion reaction, exothermic, endothermic, limiting reagent, excess reagent, percent yield, reagent, product, limiting reagent, excess reagent, Lewis structure, lone pair, double bond, bond angle, ideal gas, ideal gas law, combined gas law, nonpolar, and any other vocabulary word you can think of.