Chem 1110 and Chem 106 Exam 2 Study Guide

<mark>Chapter 4</mark>

4.1 From the periodic table, determine the number of valence electrons in a Lewis dot diagram for an element.

- Master Tutor Section 4.1
- Review Section 4.1 in the Concept Summary
- Review Examples 4.2, 4.3 and Learning Checks 4.2, 4.3
- For practice, do Exercise 4.2

4.2 a) Using the periodic table, predict how many electrons a neutral atom will gain or lose to obtain a noble gas configuration.b) Using equations, show how the gain or loss of electrons determines the charge of an ion.

- Master Tutor Section 4.2
- Review Section 4.2 in the Concept Summary
- Review Examples 4.4, 4.5 and Learning Checks 4.4, 4.5
- For practice, do Exercises 4.12, 4.14, and 4.16

4.3 Determine the ionic charges of metal and nonmetal ions from the periodic table (Sec 4.2) and predict the correct formula for the ionic compound formed between them.

- Master Tutor Section 4.3
- Review Section 4.3 in the Concept Summary
- Review Example 4.6 and Learning Check 4.6
- For practice, do Exercises 4.20, 4.22, and 4.24

4.4 a) Given the name of a simple binary ionic compound, determine its formula, or vice versa. b) Using Roman numerals for metal ions that can have more than one charge and given the compound name, determine its formula and vice versa. Learn the names of metals 11, 12, 19, and 20

and the nonmetals 6, 7, 8, 9, 15, 16, and 17 so that you can name binary ionic compounds.

- Master Tutor Section 4.4
- Review Section 4.4 in the Concept Summary
- Review Examples 4.7, 4.8 and Learning Checks 4.7, 4.8
- For practice, do Exercises 4.26, 4.28, 4.30, and 4.32

4.5 You may skip this section. It is not covered in the Tutor or Exam 2.

4.6 Correctly draw and interpret Lewis structures for covalently bonded molecules.

- Master Tutor Section 4.6
- Review Section 4.6 in the Concept Summary
- Review Examples 4.10, 4.11 and Learning Checks 4.10, 4.11
- For practice, do Exercise 4.48

4.7 Correctly draw and interpret Lewis structures for polyatomic ions.

- Master Tutor Section 4.7
- Review Section 4.7 in the Concept Summary
- Review Example 4.12 and Learning Check 4.12
- For practice, do Exercise 4.50

4.8 You may skip this section. It is not covered in the Tutor or Exam 1.

4.9 a) Using a periodic table and electronegativity differences, determine whether a bond is ionic, polar covalent or non-polar covalent.b) Use a periodic table to determine relative electronegativities of atoms and how that determines the polarity of a molecule. You don't have to memorize Table 4.4 of electronegativities.

- Master Tutor Section 4.9
- Review Section 4.9 in the Concept Summary

- Review Examples 4.15, 4.16 and Learning Checks 4.15, 4.16
- For practice, do Exercises 4.56, 4.58, and 4.64

4.10 a) Given a chemical name of a metal+polyatomic compound (including metals with variable charges indicated by Roman numerals), provide the chemical formula, or vice versa. b) Given the chemical name of a nonmetal+nonmetal covalently bonded molecule (using prefixes such as mon-, di-, tri-, etc.), provide the chemical formula, or vice versa. Know the names, formulas, and charges of the polyatomic ions: ammonium, carbonate, bicarbonate, hydroxide, phosphate, nitrate and sulfate.

- Master Tutor Section 4.10
- Review Section 4.10 in the Concept Summary
- Review Examples 4.17, 4.18 and Learning Checks 4.17, 4.18
- For practice, do Exercises 4.66, 4.68, and 4.72

4.11 Identify and differentiate characteristics due to dispersion, dipolar, covalent, ionic and metallic forces between molecules, ions, or atoms (metallic).

- Master Tutor Section 4.11
- Review Section 4.11 in the Concept Summary
- Review Example 4.19 and Learning Check 4.19
- For practice, do Exercise 4.78

Chapter 5

5.1 Balance a chemical reaction, understanding the concept of determining the number of identical atoms on each side.

- Master Tutor Section 5.1
- Review Section 5.1 in the Concept Summary
- Review Examples 5.1, 5.2 and Learning Checks 5.1, 5.2
- For practice, do Exercises 5.4 and 5.8

5.2 You may skip this section. It is not covered in the Tutor or Exam 2.

5.3 You may skip this section. It is not covered in the Tutor or Exam 2.

5.4, 5.5, 5.6 Identify combination, decomposition, single- and double-replacement reactions; ignore the redox and nonredox parts.

- Master Tutor Section 5.4, 5.5, and 5.6
- Review Section 5.4, 5.5, and 5.6 in the Concept Summary
- Review Example 5.5 and Learning Check 5.5
- For practice, do Exercise 5.20; ignore the redox and nonredox part

5.7 a) Be able to dissociate ionic compounds labeled (aq) and create total ionic chemical equations. b) Identify spectator ions and provide net ionic equations from total ionic equations.

- Master Tutor Section 5.7
- Review Section 5.7 in the Concept Summary
- Review Example 5.6 and Learning Check 5.6
- For practice, do Exercises 5.28 and 5.30
- 5.8 Know the key terms exothermic and endothermic.
 - Master Tutor Section 5.8
 - Review Section 5.8 in the Concept Summary
 - For practice, do Exercise 5.34

5.9 a) Given a balanced chemical equation and given the number of moles (or molecules) of a given compound, calculate the number of moles (or molecules) of another compound. b) Given a balanced chemical equation and given the number of moles or grams of a given compound, calculate the number of grams of another compound.

• Master Tutor Section 5.9

- Review Section 5.9 in the Concept Summary
- Review Example 5.7 and Learning Check 5.7
- For practice, do Exercises 5.38 and 5.44

5.10 Given the number of grams or moles of reactants, predict how many grams of a product is formed and what the limiting reagent (reactant) is.

- Master Tutor Section 5.10
- Review Section 5.10 in the Concept Summary
- Review Examples 5.8, 5.9 and Learning Check 5.8
- For practice, do Exercise 5.52

5.11 Calculate the % yield of a reaction given the number of moles or grams reacted.

- Master Tutor Section 5.11
- Review Section 5.11 in the Concept Summary
- Review Example 5.10 and Learning Check 5.9
- For practice, do Exercises 5.56 and 5.60

Key Equations: Be sure to put these on your exam notes.

<mark>Chapter 6</mark>

6.1 a) Identify states of matter based on physical characteristics.b) Use the concepts of disruptive and cohesive forces to explain physical characteristics of substances.

- Master Tutor Section 6.1
- Review Section 6.1 in the Concept Summary

6.2 Apply how temperature affects cohesive (potential energy) and disruptive (kinetic energy) forces.

- Master Tutor Section 6.2
- Review Section 6.2 in the Concept Summary
- For practice, do Exercise 6.8

6.3, 6.4, and 6.5 Use the kinetic molecular theory to explain and compare the properties of matter in different states.

- Master Tutor Section 6.3, 6.4, and 6.5
- Review Sections 6.3, 6.4, and 6.5 in the Concept Summary
- For practice, do Exercises 6.12 and 6.16

6.6 a) Know the definition of absolute zero and interconvert °C with Kelvins. b) Interconvert atmospheres, mm of Hg, and torr pressure units.

- Master Tutor Section 6.6
- Review Section 6.6 in the Concept Summary
- Review Examples 6.4, 6.5 and Learning Checks 6.4, 6.5
- For practice, do Exercises 6.18 and 6.20

6.7 a) Applying Boyle's Law, given a pressure and a volume of a gas, calculate the new pressure or volume of the gas.b) Use the combined gas law to solve problems related to the temperature pressure and volume of a gas.

- Master Tutor Section 6.7
- Review Section 6.7 in the Concept Summary
- Review Examples 6.6, 6.7 and Learning Check 6.6
- For practice, do Exercises 6.24 and 6.26

6.8 You may skip this section. It is not covered in the Tutor or Exam 2.

6.9 You may skip this section. It is not covered in the Tutor or Exam 2.

6.10 You may skip this section. It is not covered in the Tutor or Exam 2.

6.11 Identify change of state processes (ie. evaporation) as endothermic or exothermic.

- Master Tutor Section 6.11
- Review Section 6.11 in the Concept Summary
- Review Learning Check 6.11
- For practice, do Exercise 6.64

6.12 Know what vapor pressure is and how temperature affects it.

- Master Tutor Section 6.12
- Review Section 6.12 in the Concept Summary

6.13 Understand that atmospheric pressure decreases with increasing altitude. Apply the concept of boiling, occurring when the vapor pressure of a liquid equals atmospheric pressure.

- Master Tutor Section 6.13
- Review Section 6.13 in the Concept Summary

6.14 Know the process of sublimation.

- Master Tutor Section 6.14
- Review Section 6.14 in the Concept Summary

6.15 You may skip this section. It is not covered in the Tutor or Exam 2

Key Equations: Be sure to put these on your exam notes. Add the following polyatomics to your exam notes:

NH₄⁺ ammonium
OH⁻ hydroxide
HCO₃⁻ bicarbonate (or hydrogen carbonate)

NO₃nitrate

CO₃²⁻ carbonate

sulfate

SO₄²⁻ PO₄³⁻ phosphate