**Honors Chemistry II Unit 7 Tentative Agenda** Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Stoichiometry

| **Date** | **Agenda** |
| --- | --- |
| Thursday 12/5 | * Begin Chapter 3 Notes (Stoichiometry)   + Stoichiometry and Reactions will have a combined test at the conclusion of Unit 7. * Homework:   + Read Chapter 3   + Mastering 1-10 |
| Friday 12/6 | * Finish Chapter 3 Notes * Homework:   + Mastering 11-20 |
| Monday 12/9 | * Inquiry Lab: Identity of an Unknown Metal Chlorate   + You may use other techniques to confirm, but I want you to do a quantitative test involving percent composition/mole fraction to determine this empirically. * Inquiry Lab: Percent Water in a Hydrate   + I’ll give you some hydrated compounds to choose from. You will determine the chemical formula including the number of waters of hydration. * Inquiry Lab: Molar Mass of a Gas   + I’ll show you some techniques for gas collection. Then you can determine how you want to proceed and which gas you want to determine the molar mass of. * Homework:   + Mastering 21-30 |
| Tuesday 12/10 | * Inquiry Lab: Identity of an Unknown Metal Chlorate * Inquiry Lab: Percent Water in a Hydrate * Inquiry Lab: Molar Mass of a Gas * Homework:   + Mastering 31-40 |
| Wednesday 12/11 | * Inquiry Lab: Identity of an Unknown Metal Chlorate * Inquiry Lab: Percent Water in a Hydrate * Inquiry Lab: Molar Mass of a Gas * Work on Mastering in class (if you’re finished with lab). * Homework:   + Mastering 41-end |
| Thursday 12/12 | * Stoichiometry Quiz * Work on Mastering in class. |
| Friday 12/13 | * Unit 6 & 7 Review (Reactions and Stoichiometry)   + Note that there are no “Hints of the day” this time. This is because questions on the test will be exclusively related to reactions and stoichiometry. * Mastering Due @ 11:59PM |
| Monday 12/16 | * Unit 6 & 7 Test (Reactions and Stoichiometry) |
| Tuesday 12/17 | * Go over Unit 6 & 7 Test.   http://images.fineartamerica.com/images-medium-large/christmas-nativity-diane-wigstone.jpg http://0.tqn.com/d/laundry/1/0/j/I/-/-/Menorah.png http://www.carlsbaddancecentre.com/wp-content/uploads/2013/10/2013-happy-new-year-wallpapers-15.jpg |

**LO 1.1 The student can justify the observation that the ratio of the masses of the constituent elements in any pure sample of that compound is always identical on the basis of the atomic molecular theory. [See SP 6.1]**

Big Idea 1: The chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.

The atomic theory of matter is the most fundamental premise of chemistry. A limited number of chemical elements exist, and the fundamental unit of the chemical identities they carry is the atom. Although atoms represent the foundational level of chemistry, observations of chemical properties are always made on collections of atoms, and macroscopic systems involve such large numbers that they are typically counted in the unit known as the mole rather than as individual atoms. For elements, many chemical and physical properties exhibit predictable periodicity as a function of atomic number. In all chemical and physical changes, atoms are conserved.

Enduring understanding 1.A: All matter is made of atoms. There are a limited number of types of atoms; these are the elements.

The concept of atoms as the building blocks of all matter is a fundamental premise of the discipline of chemistry. This concept provides the foundation for conceptualizing, interpreting, and explaining the macroscopic properties and transformations observed inside and outside the laboratory in terms of the structure and properties of the constituent materials. The concept of the mole enables chemists to relate measured masses in the laboratory to the number of particles present in a sample. These two concepts also provide the basis for the experimental determination of the purity of a sample through chemical analysis. The most important aspect of chemistry is not the memorization of the laws and definitions, but rather the ability to explain how the laws and relationships arise because of the atomic nature of matter.

Essential knowledge 1.A.1: Molecules are composed of specific combinations of atoms; different molecules are composed of combinations of different elements and of combinations of the same elements in differing amounts and proportions.

a. The average mass of any large number of atoms of a given element is always the same for a given element.

b. A pure sample contains particles (or units) of one specific atom or molecule; a mixture contains particles (or units) of more than one specific atom or molecule.

c. Because the molecules of a particular compound are always composed of the identical combination of atoms in a specific ratio, the ratio of the masses of the constituent elements in any pure sample of that compound is always the same.

d. Pairs of elements that form more than one type of molecule are nonetheless limited by their atomic nature to combine in whole number ratios. This discrete nature can be confirmed by calculating the difference in mass percent ratios between such types of molecules.

Learning Objectives for EK 1.A.2:

**LO 1.2 The student is able to select and apply mathematical routines to mass data to identify or infer the composition of pure substances and/or mixtures. [See SP 2.2]**

**LO 1.3 The student is able to select and apply mathematical relationships to mass data in order to justify a claim regarding the identity and/or estimated purity of a substance. [See SP 2.2, 6.1]**

Essential knowledge 1.A.2: Chemical analysis provides a method for determining the relative number of atoms in a substance, which can be used to identify the substance or determine its purity.

a. Because compounds are composed of atoms with known masses, there is a correspondence between the mass percent of the elements in a compound and the relative number of atoms of each element.

b. An empirical formula is the lowest whole number ratio of atoms in a compound.

Two molecules of the same elements with identical mass percent of their constituent atoms will have identical empirical formulas.

c. Because pure compounds have a specific mass percent of each element, experimental measurements of mass percents can be used to verify the purity of compounds.

Learning Objective for EK 1.A.3:

**LO 1.4 The student is able to connect the number of particles, moles, mass, and volume of substances to one another, both qualitatively and quantitatively. [See SP 7.1]**

Essential knowledge 1.A.3: The mole is the fundamental unit for counting numbers of particles on the macroscopic level and allows quantitative connections to be drawn between laboratory experiments, which occur at the macroscopic level, and chemical processes, which occur at the atomic level.

a. Atoms and molecules interact with one another on the atomic level. Balanced chemical equations give the number of particles that react and the number of particles produced. Because of this, expressing the amount of a substance in terms of the number of particles, or moles of particles, is essential to understanding chemical processes.

b. Expressing the mass of an individual atom or molecule in atomic mass unit (amu) is useful because the average mass in amu of one particle (atom or molecule) of a substance will always be numerically equal to the molar mass of that substance in grams.

c. Avogadro’s number provides the connection between the number of moles in a pure sample of a substance and the number of constituent particles (or units) of that substance.

d. Thus, for any sample of a pure substance, there is a specific numerical relationship between the molar mass of the substance, the mass of the sample, and the number of particles (or units) present.

**LO 1.17 The student is able to express the law of conservation of mass quantitatively and qualitatively using symbolic representations and particulate drawings. [See SP 1.5]**

Enduring understanding 1.E: Atoms are conserved in physical and chemical processes.

The conservation of mass in chemical and physical transformations is a fundamental concept, and is a reflection of the atomic model of matter. This concept plays a key role in much of chemistry, in both quantitative determinations of quantities of materials involved in chemical systems and transformations, and in the conceptualization and representation of those systems and transformations.

Essential knowledge 1.E.1: Physical and chemical processes can be depicted symbolically; when this is done, the illustration must conserve all atoms of all types.

a. Various types of representations can be used to show that matter is conserved during chemical and physical processes.

1. Symbolic representations

2. Particulate drawings

b. Because atoms must be conserved during a chemical process, it is possible to calculate product masses given known reactant masses, or to calculate reactant masses given product masses.

c. The concept of conservation of atoms plays an important role in the interpretation and analysis of many chemical processes on the macroscopic scale. Conservation of atoms should be related to how nonradioactive atoms are neither lost nor gained as they cycle among land, water, atmosphere, and living organisms.

**LO 1.18 The student is able to apply conservation of atoms to the rearrangement of atoms in various processes. [See SP 1.4]**

**LO 1.19 The student can design, and/or interpret data from, an experiment that uses gravimetric analysis to determine the concentration of an analyte in a solution. [See SP 4.2, 5.1, 6.4]**

Essential knowledge 1.E.2: Conservation of atoms makes it possible to compute the masses of substances involved in physical and chemical processes. Chemical processes result in the formation of new substances, and the amount of these depends on the number and the types and masses of elements in the reactants, as well as the efficiency of the transformation.

a. The number of atoms, molecules, or formula units in a given mass of substance can be calculated.

b. The subscripts in a chemical formula represent the number of atoms of each type in a molecule.

c. The coefficients in a balanced chemical equation represent the relative numbers of particles that are consumed and created when the process occurs.

d. The concept of conservation of atoms plays an important role in the interpretation and analysis of many chemical processes on the macroscopic scale.

e. In gravimetric analysis, a substance is added to a solution that reacts specifically with a dissolved analyte (the chemical species that is the target of the analysis) to form a solid. The mass of solid formed can be used to infer the concentration of the analyte in the initial sample.

f. Titrations may be used to determine the concentration of an analyte in a solution. The titrant has a known concentration of a species that reacts specifically with the analyte. The equivalence of the titration occurs when the analyte is totally consumed by the reacting species in the titrant. The equivalence point is often indicated by a change in a property (such as color) that occurs when the equivalence point is reached. This observable event is called the end point of the titration.

**LO 3.4 The student is able to relate quantities (measured mass of substances, volumes of solutions, or volumes and pressures of gases) to identify stoichiometric relationships for a reaction, including situations involving limiting reactants and situations in which the reaction has not gone to completion. [See SP 2.2, 5.1, 6.4]**

Essential knowledge 3.A.2: Quantitative information can be derived from stoichiometric calculations that utilize the mole ratios from the balanced chemical equations. The role of stoichiometry in real-world applications is important to note, so that it does not seem to be simply an exercise done only by chemists.

a. Coefficients of balanced chemical equations contain information regarding the proportionality of the amounts of substances involved in the reaction. These values can be used in chemical calculations that apply the mole concept; the most important place for this type of quantitative exercise is the laboratory.

1. Calculate amount of product expected to be produced in a laboratory experiment.

2. Identify limiting and excess reactant; calculate percent and theoretical yield for a given laboratory experiment.

b. The use of stoichiometry with gases also has the potential for laboratory experimentation, particularly with respect to the experimental determination of molar mass of a gas.

c. Solution chemistry provides an additional avenue for laboratory calculations of stoichiometry, including titrations.

**LO 3.5 The student is able to design a plan in order to collect data on the synthesis or decomposition of a compound to confirm the conservation of matter and the law of definite proportions. [See SP 2.1, 4.2, 6.4]**

**LO 3.6 The student is able to use data from synthesis or decomposition of a compound to confirm the conservation of matter and the law of definite proportions. [See SP 2.2, 6.1]**

Enduring understanding 3.B: Chemical reactions can be classified by considering what the reactants are, what the products are, or how they change from one into the other. Classes of chemical reactions include synthesis, decomposition, acid-base, and oxidation-reduction reactions.

Essential knowledge 3.B.1: Synthesis reactions are those in which atoms and/or molecules combine to form a new compound. Decomposition is the reverse of synthesis, a process whereby molecules are decomposed, often by the use of heat.

a. Synthesis or decomposition reactions can be used for acquisition of basic lab techniques and observations that help students deal with the abstractions of atoms and stoichiometric calculations.

**Mastering Chemistry Assignment Breakdown**

| [**#**](http://session.masteringchemistry.com/myct/yui-dt0-href-ordinal) | [**TITLEShow Descriptions**](http://session.masteringchemistry.com/myct/yui-dt0-href-title) | | **DIFFICULTY** | | | **MEDIAN TIME** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [**This Course**](http://session.masteringchemistry.com/myct/yui-dt0-href-courseDifficulty) | [**System**](http://session.masteringchemistry.com/myct/yui-dt0-href-systemDifficulty) | | [**This Course**](http://session.masteringchemistry.com/myct/yui-dt0-href-formattedCourseTime) | [**System**](http://session.masteringchemistry.com/myct/yui-dt0-href-formattedSystemTime) | |
| 1 | [Balancing Chemical Equations](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236300) | | -- | 1 | | -- | 2m | |
| 2 | [Chemical Equations](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236334) | | -- | 3 | | -- | 15m | |
| 3 | [Give It Some Thought: 3.1](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236348) | | -- | 2 | | -- | 1m | |
| 4 | [Problem 3.1](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236364) | | -- | 1 | | -- | 1m | |
| 5 | [Problem 3.4](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236618) | | -- | 5 | | -- | 5m | |
| 6 | [Problem 3.6](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236716) | | -- | 2 | | -- | 4m | |
| 7 | [Problem 3.61](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236758) | | -- | 2 | | -- | 11m | |
| 8 | [Problem 3.7](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236780) | | -- | 1 | | -- | 1m | |
| 9 | [Problem 3.8](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236822) | | -- | 2 | | -- | 4m | |
| 10 | [Problem 3.25](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236851) | | -- | 1 | | -- | 6m | |
| 11 | [Problem 3.26](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236865) | | -- | 2 | | -- | 5m | |
| 12 | [Problem 3.55](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236874) | | -- | 2 | | -- | 5m | |
| 13 | [Problem 3.69](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236880) | | -- | 2 | | -- | 9m | |
| 14 | [Problem 3.77](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236919) | | -- | 2 | | -- | 12m | |
| 15 | [Problem 3.42](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31236976) | | -- | 2 | | -- | 6m | |
| 16 | [Chapter 3 Question 1 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237028) | | -- | 1 | | -- | 2m | |
| 17 | [Problem 3.13](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237118) | | -- | 2 | | -- | 24m | |
| 18 | [Chapter 3 Question 7 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237163) | | -- | 1 | | -- | 1m | |
| 19 | [Combination, Decomposition, and Combustion Reactions](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237175) | | -- | 3 | | -- | 16m | |
| 20 | [Problem 3.16](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237229) | | -- | 3 | | -- | 13m | |
| 21 | [Chapter 3 Question 3 - Multiple-Choice](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237262) | | -- | 1 | | -- | <1m | |
| 22 | [Chapter 3 Question 25 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237270) | | -- | 2 | | -- | 1m | |
| 23 | [Chapter 3 Question 10 - Multiple-Choice](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237285) | | -- | 1 | | -- | <1m | |
| 24 | [Formula Weights](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237257) | | -- | 1 | | -- | 4m | |
| 25 | [± Ionic Compound Analysis](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237259) | | -- | 2 | | -- | 5m | |
| 26 | [± Percent Composition](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237323) | | -- | 2 | | -- | 10m | |
| 27 | [Calculations Using the Mole](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237383) | | -- | 2 | | -- | 11m | |
| 28 | [± Avogadro's Number](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237336) | | -- | 3 | | -- | 16m | |
| 29 | [± The Mass of One Sugar Molecule](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237385) | | -- | 2 | | -- | 6m | |
| 30 | [± Counting Atoms using Avogadro's Number](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237341) | | -- | 2 | | -- | 7m | |
| 31 | [Give It Some Thought: 3.3](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237378) | | -- | 1 | | -- | 1m | |
| 32 | [Problem 3.28](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237381) | | -- | 3 | | -- | 7m | |
| 33 | [Chapter 3 Question 29 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237504) | | -- | 1 | | -- | 1m | |
| 34 | [Chapter 3 Question 42 - Multiple-Choice](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237547) | | -- | 1 | | -- | 2m | |
| 35 | [± Empirical Formula Procedure](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237575) | | -- | 1 | | -- | 8m | |
| 36 | [± Empirical Formula by Combustion Analysis](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237645) | | -- | 2 | | -- | 17m | |
| 37 | [Empirical Formula from Experimental Data](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237577) | | -- | 3 | | -- | 14m | |
| 38 | [Percent Composition and Formulas](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237664) | | -- | 2 | | -- | 8m | |
| 39 | [Problem 3.47](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237656) | | -- | 4 | | -- | 4m | |
| 40 | [Problem 3.48](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237698) | | -- | 2 | | -- | 4m | |
| 41 | [Problem 3.51](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237912) | | -- | 1 | | -- | 13m | |
| 42 | [Problem 3.58](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237970) | | -- | 2 | | -- | 4m | |
| 43 | [Chapter 3 Question 2 - True/False](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237940) | | -- | 1 | | -- | <1m | |
| 44 | [Chapter 3 Question 36 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31237976) | | -- | 1 | | -- | 2m | |
| 45 | [Chapter 3 Question 44 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238133) | | -- | 2 | | -- | 3m | |
| 46 | [± Learning Stoichiometry](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238141) | | -- | 3 | | -- | 18m | |
| 47 | [Give It Some Thought: 3.7](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238213) | | -- | 1 | | -- | 1m | |
| 48 | [Problem 3.65](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238215) | | -- | 3 | | -- | 11m | |
| 49 | [Chapter 3 Question 48 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238253) | | -- | 1 | | -- | 2m | |
| 50 | [Limiting Reactant Procedure](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238219) | | -- | 2 | | -- | 13m | |
| 51 | [± Limiting Reactants](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238302) | | -- | 2 | | -- | 14m | |
| 52 | [± Percent Yield](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238308) | | -- | 3 | | -- | 9m | |
| 53 | [Chapter 3 Question 4 - True/False](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238318) | | -- | 1 | | -- | 1m | |
| 54 | [Chapter 3 Question 55 - Bimodal](http://session.masteringchemistry.com/myct/itemView?showStatsForCourse=1110976&view=solution&showStats=1&assignmentProblemID=31238364) | | -- | 1 | | -- | 3m | |
| **Average:** | |  | | | **Total:** | | |  | |
| **--** | | **1.9** | | | **--** | | | **366m** | |