**Science Department Competencies and Assessments**

**AP® Chemistry**

**Course description:** The AP® Chemistry course at MRHS is a course investigating the matter and the changes in matter in greater depth than in Academic Chemistry. A major goal of the course is to prepare the student to do their best on the AP® Chemistry test. The course is based on understanding and integrating the atomic/.molecular model. The over-arching concepts are:

 1. What is matter?

 2. How does matter change?

 3. Why does matter change?-

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| **Course Power Standards** | **Assessment Tools** |
| **I. Lab Skill and Safety**: *Students demonstrate understanding of:*1. all pertinent safety rules.
2. selecting and using appropriate materials for laboratory investigation.
3. obtaining, analyzing and presenting laboratory data(i.e. use of data tables, graphs, percent error)
 | * Quizzes
* Homework
* Class work
* Laboratory work
 |
| **II. Communication** *Students demonstrate understanding of:*1. communicating using appropriate scientific vocabulary, notations and mathematics.
2. using and defining the scientific method to investigate problems.
3. reading scientific articles critically.
 | * Quizzes
* Homework
* Class work
* Tests
* Article reviews
* Seminar project

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| **III. Atomic Structure:** *Students demonstrate understanding of:*1. the make-up of the atomic nucleus and differences between elemental nuclei.
2. electron distribution including sub orbitals.
3. how the outermost electrons determine how atoms interact with each other and are the basis for molecular geometry.
4. the history of current atomic structure theory.
5. the relationship between electron configuration and the properties and location of elements on periodic table of the elements.
6. periodic trends in the Periodic Table of the Elements
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **Course Power Standards** | **Assessment Tools** |
| **IV. Bonding and Molecular Structure** *Students demonstrate understanding of:*1. ionic bonding
2. covalent bonding
3. Lewis dot structures
4. VSPER theory
5. Molecular geometry
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| **V. Molar relationships:** *Students demonstrate understanding of:*1. Avogadro’s number and the concept of the mole as a unit of count.
2. converting between the mole and other measurements
3. the five (5) general types of chemical reactions.
4. the Law of the Conservation of Mass
5. balancing equations based on the Law of the Conservation of Mass
6. apply molar relationships to stoichiometry problems including limiting reagents, theoretical yield and percent yield.
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **VI. States of Matter:** *Students demonstrate understanding of:*1. the difference on the atomic level of solids, liquids and gases
2. the Gas Laws
3. solutions and the various methods of expressing concentrations of solutions
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **VII. Thermodynamics:** *Students demonstrate understanding of:*1. how to determine the enthalpy changes involved in chemical processes (The First Law of Thermodynamics)
2. how to determine entropy changes involved in chemical processes (The Second Law of Thermodynamics)
3. how to determine the spontaneity of a reaction (Gibbs Free Energy)
4. relate Gibbs Free Energy to equilibrium constants and cell potentials
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **VIII. Equilibrium:** *Students demonstrate understanding of:*1. reversible reactions
2. dynamic equilibrium
3. calculations and usage of various equilibrium constants
4. acid/base equilibrium including pH, pKa and buffer solutions
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **Course Power Standards** | **Assessment Tools** |
| **IX. Kinetics:** *Students demonstrate understanding of:*1. rates of reactions
2. calculating rate constants
3. rate mechanisms
4. role of catalysts
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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| **IX. Electrochemistry:** *Students will demonstrate understanding of*1. balancing redox reactions
2. voltaic cells
3. calculation EMF for standard and non-standard conditions
4. relate EMF to Gibbs Free Energy
5. electrolysis
 | * Quizzes
* Homework
* Class work
* Tests
* Laboratory work
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**All prospective students must complete all three assessment types to the standards listed below and subsequent attachments.**

**Assessment #1- Projects and Summative Assessments**

These are based on concepts and projects that are covered with all Algebra classes during the course of each year. Prospective Students must complete all components of each project. The cooperating teacher must sign off on each component with a label of “meets expectations”.

**Assessment #2- Homework, Class work, and Formative Assessments**

Daily assessments of student performance and understanding used to inform instructional decisions.

**Assessment #3- Exam**

These are based on concepts and information that the students are exposed to each year. Each must be completed with the prospective student attaining a 65% or higher proficiency.