Honors Chemistry Course Expectations and Syllabus

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Course Description:

Honors Chemistry is an accelerated comprehensive laboratory course designed to give the students a more conceptual and in-depth understanding of the concepts in the *North Carolina Standard Course of Study* in Chemistry. In Honors Chemistry students are expected to work independently on a variety of assignments and accept greater responsibility for their learning. **The course will include the additional Honors objectives and an in-depth study of at least two of the listed enrichment topics.** The curriculum will integrate inquiry and technology to explore the world of chemistry.

Objectives:

The chemistry course encourages students to continue their investigation of the structure of matter along with chemical reactions and the conservation of matter and energy in these reactions. Inquiry is applied to the study of the transformation, composition, structure, and properties of substances. The course focuses on basic chemical concepts and incorporates activities that promote investigations to reinforce the concepts. The curriculum includes inquiry into the following content areas:

- Structure of atoms.
- Structure and properties of matter.
- Chemical reactions.
- Conservation of energy and matter.
- Interaction of energy and matter.

Competency Goal 1: The learner will develop abilities necessary to do and understand scientific inquiry.
Objectives 1.01 Design, conduct and analyze investigations to answer questions related to chemistry. • Identify questions and suggest hypotheses. • Identify variables. • Use a control when appropriate. • Select and use appropriate measurement tools. • Collect and organize data in tables, charts and graphs. • Analyze and interpret data. • Explain observations. • Make inferences and predictions. • Explain the relationship between evidence and explanation. • Identify how scientists share findings. 1.02 Analyze reports of scientific investigations from an informed scientifically-literate viewpoint including considerations of: • Appropriate sample. • Adequacy of experimental controls. • Replication of findings.

- Alternative interpretations of the data

1.03 Analyze experimental designs with regard to safety and use safe procedures in laboratory investigations:

- Identify and avoid potential safety hazards given a scenario.
- Differentiate between safe and unsafe procedures.
- Use information from the MSDS (Material Safety Data Sheets) to assess chemical hazards.

Competency Goal 2: The learner will build an understanding of the structure and properties of matter.

Objectives

2.01 Analyze the historical development of the current atomic theory.

- Early contributions: Democritus and Dalton.
- The discovery of the electron: Thomson and Millikan.
- The discovery of the nucleus, proton and neutron: Rutherford and Chadwick.
- The Bohr model.
- The quantum mechanical model.

2.02 Examine the nature of atomic structure.

- Subatomic particles: protons, neutrons, and electrons.
- Mass number.
- Atomic number.
- Isotopes.

2.03 Apply the language and symbols of chemistry.

- Name compounds using the IUPAC conventions.
- Write formulas of simple compounds from their names.

2.04 Identify substances using their physical properties:

- Melting points.
- Boiling points.
- Density.
- Solubility.

2.05 Analyze the basic assumptions of kinetic molecular theory and its applications:

- Ideal Gas Equation.
- Combined Gas Law.
- Dalton's Law of Partial Pressures.

2.06 Assess bonding in metals and ionic compounds as related to chemical and physical properties.
2.07 Assess covalent bonding in molecular compounds as related to molecular geometry and chemical and physical properties.

- Molecular.
- Macromolecular.
- Hydrogen bonding and other intermolecular forces (dipole/dipole interaction, dispersion).
- VSEPR theory.

2.08 Assess the dynamics of physical equilibria.

- Interpret phase diagrams.

- Factors that affect phase changes.

Competency Goal 3: The learner will build an understanding of regularities in chemistry.

Objectives

3.01 Analyze periodic trends in chemical properties and use the periodic table to predict properties of elements.

- Groups (families).
- Periods.
- Representative elements (main group) and transition elements.
- Electron configuration and energy levels.
- Ionization energy.
- Atomic and ionic radii.
- Electronegativity.

3.02 Apply the mole concept, Avogadro's number and conversion factors to chemical calculations.

- Particles to moles.
- Mass to moles.
- Volume of a gas to moles.
- Molarity of solutions.
- Empirical and molecular formula.
- Percent composition.

3.03 Calculate quantitative relationships in chemical reactions (stoichiometry).

- Moles of each species in a reaction.
- Mass of each species in a reaction.
- Volumes of gaseous species in a reaction.

Competency Goal 4: The learner will build an understanding of energy changes in chemistry.

Objectives

4.01 Analyze the Bohr model in terms of electron energies in the hydrogen atom.

- The spectrum of electromagnetic energy.
- Emission and absorption of electromagnetic energy as electrons change energy levels.

4.02 Analyze the law of conservation of energy, energy transformation, and various forms of energy involved in chemical and physical processes.

- Differentiate between heat and temperature.
- Analyze heating and cooling curves.
- Calorimetry, heat of fusion and heat of vaporization calculations.
- Endothermic and exothermic processes including interpretation of potential energy.
- Diagrams (energy vs reaction pathway), enthalpy and activation energy.

4.03 Analyze the relationship between entropy and disorder in the universe.

4.04 Analyze nuclear energy.

- Radioactivity: characteristics of alpha, beta and gamma radiation.
- Decay equations for alpha and beta emission.
- Half-life.

- Fission and fusion.

Competency Goal 5: The learner will develop an understanding of chemical reactions.

Objectives

5.01 Identify various types of chemical reactions:

- Single replacement.
- Double replacement.
- Decomposition.
- Synthesis.
- Combustion of hydrocarbons.

5.02 Apply the law of conservation of matter to the balancing of chemical equations.

5.03 Identify the indicators of chemical change:

- Formation of a precipitate.
- Evolution of a gas.
- Color change.
- Absorption or release of heat.

5.04 Identify the physical and chemical behaviors of acids and bases.

- General properties of acids and bases.
- Concentration and dilution of acids and bases.
- Ionization and the degree of dissociation (strengths) of acids and bases.
- Indicators.
- Acid-base titration.
- pH and pOH.

5.05 Analyze oxidation/reduction reactions with regard to the transfer of electrons.

- Assign oxidation numbers to elements in REDOX reactions
- Identify the elements oxidized and reduced.
- Write simple half reactions.
- Assess the practical applications of oxidation and reduction reactions.

5.06 Assess the factors that affect the rates of chemical reactions.

- The nature of the reactants.
- Temperature.
- Concentration.
- Surface area.
- Catalyst.

Enrichment topics: In depth study of at least two of the following eight enrichment topics is required in addition to the extended objectives listed below.

1. Crystal structure
2. Environmental Chemistry
3. Organic Chemistry
4. Nuclear medicine
5. Textile chemicals
6. Polymers
7. Forensics
8. Chemistry of computers

Honors Objectives: The following objectives are extensions of those in the 2004 revision of the *Standard Course of Study* for Chemistry. The numbers are to show placement in the *Standard Course of Study.*

2.01-1 H Apply quantum numbers to electron configurations.

2.02-1 H Analyze (calculate) average atomic mass from relative abundance and actual isotopic mass.

3.03-1 H Evaluate reactions to determine limiting reactant and percent yield.

4.02-1 H Summarize energy changes within a reaction to determine heats of reaction.

4.03-1 H Predict spontaneity by the use of Gibbs Free Energy.

5.05-1 H Analyze redox reactions by balancing via half reaction method or electron transfer method.

Honors Chemistry Units:
Unit 1 – Chemtools: An Introduction to Chemistry
Unit 2 - Atomic Theory and Structure
Unit 3 - Electromagnetic Spectrum and Quantum Theory
Unit 4 - Periodic Table and Trends
Unit 5 - Chemical Bonding and Language of Chemistry
Unit 6 - Molecular Geometry
Unit 7 - Mole Concept
Unit 8 - Chemical Reactions
Unit 9 - Stoichiometry
Unit 10 - Kinetic Molecular Theory
Unit 11 – Thermochemistry & Reaction Rates: Kinetics
Unit 12 - Redox
Unit 13 - Acids & Bases
Unit 14 - Nuclear Chemistry

Prerequisite:
Recommended completion of or be currently enrolled in Geometry. Ninth grade students need approval from a Guidance Counselor before signing up

Suggested Grade Level:
Honors Chemistry is intended to be a tenth or eleventh grade course for students accelerated in mathematics. Success in Honors Chemistry will require the student to: 1) operate with algebraic expressions to solve problems using direct, inverse, combined, and joint variation, 2) use logarithms and exponents to solve problems, and 3) describe graphically, algebraically and verbally real-world phenomena as functions and identify the independent and dependent variables.

Materials/Equipment:
Students will need a class notebook, a lab notebook, pens or pencils, and a scientific calculator.

Evaluation:
Term grades will consist of 3 parts: a test average (40%), a lab average (20%), and a daily grade average (40%). To calculate the grade for a term, use the following:

(Test Average) (.4) + (Daily Average) (.4) + (Lab Average) (.2) = Term Grade

There will be approximately 6 to 8 tests and major labs per term. The daily grade average includes homework, class work, and quizzes. **After the first 2 weeks of the term, a weekly progress report will be sent home. This is to be reviewed, signed, and returned to school. This will be given out on the first day of the week and is counted as part of the daily grade**.

The final grade for the course is calculated by using the following:

(1^{st} Term Grade) (.375) + (2^{nd} Term Grade) (.375) + (Exam Score) (.25) = Final Grade

In order to receive credit for the course a student must have a passing final average for the course and not miss more than 7 days of class**.**

Grading Scale:

A	Superior	100-93
B	Good	92-85
C	Average	84-77
D	Poor	76-70
F	Failing	69 and below

Homework/Class Work:
Homework/Class Work is assigned each day and is used for practice, evaluations, and understanding of content.

Make-up work:
Students are expected to bring a legitimate excuse note signed by a parent/guardian within 2 school days of an absence in order for the absence to be marked excused. It is the student's responsibility to initiate make-up work, including tests. Students may make up work for excused absences only. Make-up work without an excused slip will be counted as a zero. A course folder is available to get the daily agendas for each day.

Attendance Policy:
Attendance will be taken in each class. Students with more than seven (7) class absences, within a given semester—excused or unexcused—will receive a failing grade (FF) for that course. **There is no makeup time allowed**. At the end of each semester, the principal will convene an attendance advisory committee of certified school personnel to hear individual appeals of students who have failed to meet the minimum attendance requirements. An appeal may be initiated by the parent or student. Notice of an appeal must be made to the principal no later than the last school day of the semester. In reviewing individual cases, the committee will take into account factors such as: the number of days missed, academic performance, level of parental support, circumstances beyond the control of the student, general health of the student, and extended illnesses. Having heard the appeal the committee will make a recommendation to the principal regarding the awarding of credit. The principal has final authority regarding credit decisions. An absence is defined as missing more than half of a class. Absences, as a result of school-sponsored trips or of a student being attended to by the student services staff or administrators, do not count toward the number of days missed.

Tutoring:
Students may get extra help either **before school** or by arranging a time with the teacher.

Student Conduct:
Student expectations for Honors Chemistry:

- Students are to be on time to class
- Students are to be prepared for class with all necessary materials. This means the student is to bring the chemistry text, a notebook, and a writing utensil (no red pens) each day.
- Students are expected to treat fellow students, teachers, and themselves with respect.
- Students are expected to remain in the class room during the entire period.
- Students are expected to follow the Student Handbook rules.

Clubs:
Students are encouraged to join the Science Club which is sponsored by Mr. Windley.

Contact:
Please contact me when you have any questions or concerns. My room number is E-08 and the school phone number is (252) 453-0014. My extension is 302. I am usually at school by 7:30 AM.

Cut here and return to teacher

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Signature page:

Please sign the following and have your child return this page to school to signify that you and your child have gone over the course expectations for Honors Chemistry. Have your child keep the course expectations for future reference.

Thank you.

Student signature:_____ Date:_____

Parent signature:_____ Date:_____