

PETERS TOWNSHIP SCHOOL DISTRICT

CORE BODY OF KNOWLEDGE (CBK)

CHEMISTRY HONORS

GRADES 9-11

For each of the sections that follow, students may be required to understand, apply, analyze, evaluate or create the particular concepts being taught.

COURSE DESCRIPTION

Chemistry Honors is offered as a first year course in chemistry at Peters Township High School. It is targeted for students who are in the honors track. These students typically take Chemistry Honors in 10th grade. Students in this course are considering a science major in college.

Chemistry Honors meets for seven 41-minute periods each week, including 2 back-to-back double periods. This arrangement provides flexibility for lab, small group collaboration, testing, and open-ended investigations. The course is taught in a combination lecture-lab room, which is well equipped with instructional technology and lab equipment. Facilities include computers with internet access, digital projector, balances, and a variety of computer based probeware.

This curriculum is aligned with both the Pennsylvania State Standards as well as the assessment anchors posted for the Keystone Exams. It covers the following topics:

STUDY SKILLS

- Students will be given a unit assignment for each chapter with problems/theory questions that are representative to those on the chapter exam.
- Students will apply content in the laboratory setting.
- Time during class will be utilized to practice more complex example problems that are representative to those on the chapter exam.
- Students are encouraged to work in study groups to prepare for exams so that they can self-reflect on their true level of understanding of the course material.

UNIT THEMES

1. MATTER AND MEASUREMENT

- Describe the nature of the scientific method and identify its strengths and weaknesses
- Explain the significance of the Law of Conservation of Matter and Energy to chemical change
- Outline a classification scheme for matter
- Apply the factor label method and SI units in problem solving
- Explain uncertainty in measurement using accuracy, precision, and significant figures

2. ATOMIC THEORY

- Outline the historical development of Dalton's Atomic Theory
- Trace the evolution of Dalton's Atomic Theory into the modern atomic theory
- Describe the composition, structure and function of the nucleus and the electron cloud
- Relate the numbers and masses of atoms to moles
- Use notations to describe the positions of electrons in atoms

3. PERIODIC LAW

- Explain the Periodic Law
- Relate the arrangement of the Periodic Table to observable properties of elements
- Relate the arrangement of the Periodic Table to electron arrangements in atoms
- Use atomic theory to explain periodic trends

4. CHEMICAL BONDING

- Distinguish between ionic and covalent bonding, including the forces at work, the outcomes of the processes, the energy changes involved, and the notations used to describe them
- Use electronegativity to predict bond type
- Relate bond polarity and molecular structure to molecular polarity
- Use VSEPR to predict molecular geometry
- Apply intermolecular forces to determine properties of compounds

5. LANGUAGE OF CHEMISTRY

- Write chemical formulas and names for compounds, and solve related problems
- Predict the products of chemical change and write balanced equations to describe them
- Solve stoichiometry problems

6. GASES

- Use the Kinetic Theory of Matter to explain observable properties of gases
- Describe and apply laws for gas behavior, including Boyle, Charles and Gay Lussac
- Calculate gas stoichiometry problems not at STP
- Solve for and use the ideal gas law to solve gas problems

7. LIQUIDS AND SOLIDS

- Use Kinetic Theory of Matter to explain the observable properties of liquids and solids
- Explain Le Chatelier's Principle using equilibrium vapor pressure
- Use equilibrium vapor pressure to explain boiling

8. SOLUTION

- Compare and contrast solutions with other types of mixtures
- Use the Kinetic Theory of Matter to explain the mechanism of solution formation
- Relate the mechanism of solution formation to solubility and heat of solution
- Use the theory of ionization to explain behavior electrolytes
- Solve problems involving solution concentrations
- Explain colligative properties
- Calculate freezing point depression and boiling point elevation problems
- Explain how an electric current flows through an electrolyte solution

- Describe the use of equilibrium in explaining the concepts of ionization, hydrolysis and solubility
- Define the processes of oxidation and reduction
- Write balanced equations for redox reactions
- Explain the role of redox reactions in electrochemistry

ACIDS AND BASES

- Define acid and base using the Arrhenius, Bronsted-Lowry and Lewis definitions
- Identify important observable properties of acids and bases
- Define acid-base neutralization
- Solve Problems involving acid-base concentration, pH and titration
- Compare strong and weak acids and bases
- Explain indicators and their role in titrations

PBL UNIT Mr. Mole is Missing!

Performance Tasks: Project Based Assessment

- Students will be able to:
Solve a forensic science mystery using chromatography
Identify suspect with evidence to support conclusion.
The teacher will present the crime scene to the students (Mr. Mole is missing)
The teacher will give students the evidence left behind from the crime
The students will write procedures for the experiments they will perform.
The students will test the evidence and organize all data collected.
The students will formally present their conclusion of which teacher committed the crime along with all evidence to support their conclusion

MATERIALS AND SUPPLEMENTALS:

Text and Experimental Lab Book: Modern Chemistry 2002 Holt, Rinehart and Winston

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