PETERS TOWNSHIP SCHOOL DISTRICT

CORE BODY OF KNOWLEDGE (CBK)

CHEMISTRY ACADEMIC

GRADE 10-11

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 Academic deals with matter, its structure, behavior, how it combines and the changes it undergoes. The structure of matter and the nature of chemical changes are approached through discussions, demonstrations, a great deal of experiments and guided discovery using typical elements and compounds. Along with the traditional theoretical approach, students will be exposed to how chemistry impacts society including the students' personal and future professional lives. Students will use chemical principles to think more intelligently about current issues involving science and technology. A great of emphasis will be placed on mathematical functions and how they are applied to chemical situations so students will need to be prepared to bring a calculator to every class. This curriculum is aligned with both the Pennsylvania State Standards as well as the assessment anchors posted for the Keystone Exams. (6 periods).

STUDY SKILLS

- Students will take notes during class discussions and maintain notes and assignments in an organized binder/notebook
- Students will complete assigned problem sets and readings in accordance with deadlines
- Students will work individually and in peer groups as a means to learn and develop problem solving skills relevant to the course and life
- Students will collect, analyze and reflect on data collected during regular experiments to obtain a deeper understanding of content discussed in class and covered in problem sets

MAJOR UNIT THEMES:

1. THE SCIENTIFIC METHOD. MATTER AND ENERGY, AND THE CHANGES THEY UNDERGO

- Define Chemistry and recognize its position in the structure of science
- Explain the parts and sequence of The Scientific Method
- Recognize the relationship between matter and energy
- Interpret the Law of Conservation of Matter and Energy
- Discriminate between the four phases of matter
- Describe the parts of The Kinetic Theory

- Explain the properties and changes in state using the Kinetic Molecular Theory
- Explain the differences between Physical and Chemical properties and changes
- Classify types of matter
- Locate types of elements on the Periodic Table

2. MEASUREMENTS

- Recognize the importance of quantitative measurements in science
- Identify the units of measurement in the SI system
- Convert within the English and Metric system
- Distinguish between heat and temperature
- Differentiate between accuracy and precession
- Value the importance of significant figures
- Use scientific notation to calculate

3. ATOMIC THEORY

- Relate Dalton's Atomic Theory to current knowledge of matter
- Interpret the Law of Multiple Proportions
- Identify parts of the atom
- Describe the function of the electron cloud
- Describe the function of the atom's nucleus
- Relate the mole to molar mass and the amount of atoms

4. ELECTRONS AND THEIR ARRANGEMENT IN THE ATOM

- Distinguish between an electron's ground state and it's excited state
- Diagram electrons in an atom using quantum numbers
- Explain the rules that govern electron configuration
- Express positions of electrons using orbital notation, electron configuration notation, and electron-dot notation

5. THE PERIODIC LAW

- Define The Periodic Law
- Recognize the value of The Periodic Table as a classification tool
- Recognize the importance of Mendeleev' s contribution to the development of The Periodic Table
- Construct a Periodic Table indicating the sub-levels of the elements
- Describe trends among groups and periods
- Relate valence electrons to chemical bonds

6. CHEMICAL BONDING

- Classify chemical bonds as ionic or covalent
- Explain what a molecule is
- Explain diatomic molecules
- Utilize electron arrangement to illustrate the formation of covalent and ionic bonds
- Relate the Octet Rule to chemical bonding

7. CHEMICAL FORMULAS AND COMPOUNDS

- Describe the importance of chemical formulas
- Write formulas for compounds given their names
- Name compounds given their chemical formulas
- Relate oxidation states to positions on The Periodic Table
- Calculate formula masses
- Calculate percent composition by mass of a compound
- Determine the empirical and molecular formula of a compound from percent composition data

8. CHEMICAL EQUATIONS AND REACTIONS

- Explain the purpose of chemical equations
- Express chemical reactions in the form of equations
- Predict products and balance equations when given reactants

9. STOICHIOMETRY

- Define Stoichiometry
- Solve mole-mole, mole-mass, and mass-mass relationship problems
- Demonstrate comprehension of limiting reagents

10. PHYSICAL CHARACTERISTICS OF GASES

- Compare and contrast real and ideal gases
- Recognize the relationships between pressure, volume, and temperature
- Describe in words and formula Boyle's Law
- Describe in words and formula Charles' Law
- Describe in words and formula Gay Lussac's Law
- Formulate The Combined Gas Law
- Describe the properties of Oxygen and Hydrogen and their allotropes

11. MOLECULAR COMPOSITION OF GASES

- Express chemical equations involving gases using Gay Lussac's Law of Combining Volumes of Gases
- State Avogadro's Principle
- Derive the Molar Volume of a Gas
- Derive The Ideal Gas Law Equation and Constant
- Calculate Stoichiometry of gases equations not at standard conditions

12. LIQUIDS AND SOLIDS

- Identify observable properties of liquids
- Relate equilibrium vapor pressure to boiling
- Define LeChatelier's Principle

13. ACIDS AND BASES

- Describe the general properties of acids
- Identify common household and industrial acids
- Describe the general properties of bases
- Identify common household and industrial bases
- Describe the importance of titration in determining pH
- Describe the importance of indicators
- Calculate molarity, molality, and normality

MATERIALS (and Supplemental materials used in course):

- Modern Chemistry (Davis, Metcalfe, Williams, Castka): Holt, Rinehart and Winston, Copyright 2002, New York, ISBN 0-03-056538-3
- Phet Simulations (http://phet.colorado.edu/en/simulations/category/chemistry)

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