# *Elizabethtown Area School District*

## Honors Chemistry

Course Number: 321

Length of Course: 18 weeks

Grade Level: 10 – 12 Required

Total Clock Hours: 120

Length of Period: 80 minutes

Date Written: June 11, 2007

Periods per Week/Cycle: 5 periods/ wk

Written By: Scott Baylor

Credits (if app.): 1.0

Weighting: 1.1 (2008-2009)

Prerequisite: Algebra I

Placement Criteria: Recommended minimum final average of 83% in honors Science course or a recommended minimum final average of 92% in previous core science class; recommended Algebra II or concurrent enrollment

Course Prerequisite: Algebra II, concurrent enrollment or recommendation of math department

Course Description:
This course is intended for the highly motivated student. In addition to the chemistry course content, students will have a more in-depth study of the material including some advanced theory. Emphasis is placed on more in-depth coverage, more challenging assignments, and more meaningful laboratory experiences. This course is recommended for students who plan to attend a post-secondary educational institution.

# *Elizabethtown Area School District*

## I. Overall Course/Grade Level Standards

Students will KNOW and be able TO DO the following as a result of taking this course.

A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

B. Analyze scale as a way of relating concepts and ideas to one another by some measure.

C. Assess and apply patterns in science and technology.

D. Evaluate experimental information for appropriateness and adherence to relevant science processes.

E. Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

F. Apply concepts about the structure and properties of matter.

G. Apply and analyze energy sources and conversions and their relationship to heat and temperature.

H. Apply the principles of motion and force.

I. Apply concepts of models as a method to predict and understand science and technology.

J. Apply the elements of scientific inquiry to solve multi-step problems.

# Honors Chemistry Adaptations to Core Curriculum

- Honors chemistry will have the following adaptations to the major areas of study:
  - The Measurements in Chemistry unit will be shortened from 8 to 6 blocks.
  - The Matter and Its Properties unit will be shortened from 8 to 7 blocks.
  - The Energy and Matter unit will be increased from 4 to 5 blocks.
  - The Atomic Theory and Structure unit will be shortened from 12 to 7 blocks.
  - The Chemical Bonding unit will be increased from 6 to 11 blocks.
  - The Nomenclature unit will be shortened from 10 to 5 blocks.
  - The Chemical Equations and Reactions unit will be increased from 7 to 11 blocks.
  - The Gas Laws unit will be shortened from 10 blocks to 6 blocks.
  - A Gas Law Stoichiometry unit will be added requiring 7 blocks.
- Significant amounts of reading for preparation (preview) and review will be assigned outside of class.
- There will be less teacher direction and more student responsibility for classroom activities, such as basic calculation/measurement skills are assumed to be present and/or will be taught when first introduced and solutions to practice problems will be posted/available and selected examples reviewed in class.
- The curriculum pacing will increase to take students out of their comfort zone part of the time.
- Assessments will be larger and less frequent.
- Little, if any, scaffolding will be allowed for quizzes/tests.
- Little class time will be scheduled for reteaching/review during and at the end of a unit.

# *Elizabethtown Area*

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## II. Content

Major Areas of Study

List all units of study below:

| Unit | Estimated Time | Materials |
|---|---|---|
| 1. Measurements in Chemistry | 6 Blocks | Text, Lab equipment, Lab supplies |
| 2. Matter and Its Properties | 7 Blocks | Text, Lab equipment, Lab supplies |
| 3. Energy and Matter | 5 Blocks | Text, Lab equipment, Lab supplies |
| 4. Atomic Theory and Structure | 7 Blocks | Text, Lab equipment, Lab supplies |
| 5. The Periodic Table | 5 Blocks | Text, Lab equipment, Lab supplies |
| 6. Chemical Bonding | 11 Blocks | Text, Lab equipment, Lab supplies |
| 7. Nomenclature | 5 Blocks | Text, Lab equipment, Lab supplies |
| 8. Chemical Equations and Reactions | 11 Blocks | Text, Lab equipment, Lab supplies |
| 9. Stoichiometry and Quantitative Chemistry | 15 Blocks | Text, Lab equipment, Lab supplies |
| 10. Gas Laws | 6 Blocks | Text, Lab equipment, Lab supplies |
| 11. Gas Stoichiometry | 7 Blocks | Text, Lab equipment, Lab supplies |

# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Measurement in Chemistry
Essential Question for the Unit: What do we need to know to solve problems in chemistry?

| **Unit Objectives/Key Questions** | Priority | Aligned to Course Standard | Aligned to PA Standard |
|---|---|---|---|
| A. What is the SI system of metric units and how is it used in chemistry? | E | A, B | 3.1.12.A, 3.1.12.D |
| B. How are calculations impacted by the accuracy of measuring devices and the precision of the measurements? | E | C, D, E | 3.1.12.C, 3.2.12.B, 3.7.12.B |
| C. How is experimental data collected and analyzed in chemistry? | I | C, D, E | 3.1.12.C, 3.2.12.B, 3.7.12.B |
| D. How do you apply accuracy and precision to density measurements of various substances? | E | C, D, E | 3.1.12.C, 3.2.12.B, 3.7.12.B |
| E. | | | |
| F. | | | |
| G, | | | |
| H. | | | |
| I. | | | |
| J. | | | |

# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Matter and Its Properties
Essential Question for the Unit: What evidence is needed to tell that a chemical reaction is occurring?

| **Unit Objectives/Key Questions** | Priority | Aligned to Course Standard | Aligned to PA Standard |
|---|---|---|---|
| A. How is matter classified? | E | A, F | 3.1.12.A, 3.4.12.A |
| B. How are chemical and physical changes/properties distinguished? | E | C, F | 3.1.12.C, 3.4.12.A |
| C. | | | |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Energy and Matter
Essential Question for the Unit: What factors determine the existence of each element?

| **Unit Objectives/Key Questions** | Priority | Aligned to Course Standard | Aligned to PA Standard |
|---|---|---|---|
| A. How do you describe the transfer of chemical energy to heat energy? | E | C, G | 3.1.12.C, 3.4.12.B |
| B. How is light energy related to electron energy levels? | I | G, H | 3.4.12.B, 3.4.12.C |
| C. | | | |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Atomic Theory and Structure
Essential Question for the Unit: How does the number and arrangement of neutrons, protons and electrons in an atom affect its properties?

| **Unit Objectives/Key Questions** | Priority | Aligned to Course Standard | Aligned to PA Standard |
|---|---|---|---|
| A. How was the atomic theory developed? | E | I, C, F | 3.1.12.B, 3.1.12.C, 3.4.12.A |
| B. What does the modern model of the atom look like? | E | A, I, C, F | 3.1.12.A, 3.1.12.B, 3.1.12.C, 3.4.12.A |
| C. What is the significance of nuclide / isotope notation? | I | C, F | 3.1.12.C, 3.4.12.A |
| D. What is an electron configuration and why is it important? | E | A, C, F | 3.1.12.A, 3.1.12.C, 3.4.12.A |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: The Periodic Table
Essential Question for the Unit: How is the Periodic Table of the Elements organized?

| **Unit Objectives/Key Questions** | Priority | Aligned to Course Standard | Aligned to PA Standard |
|---|---|---|---|
| A. What properties of the elements exhibit periodicity? | E | A, C, F | 3.1.12.A, 3.1.12.C, 3.4.12.A |
| B. Why do elements exhibit periodicity? | E | A, C, F | 3.1.12.A, 3.1.12.C, 3.4.12.A |
| C. How is the Periodic Table of the Elements organized? | I | A, C, J | 3.1.12.A, 3.1.12.C, 3.2.12.C |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Chemical Bonding
Essential Question for the Unit: How are sodium chloride and water different?

| **Unit Objectives/Key Questions** | ' | | |
|---|---|---|---|
| A. What similarities/differences exist between ionic and covalent bonding? | E | F, A, C | 3.4.12.A, 3.1.12.A, 3.1.12.C |
| B. How are ionic and covalent compounds diagrammed using valence electrons? | E | C, F, A | 3.1.12.C, 3.4.12.A, 3.1.12.A |
| C. How do intermolecular forces affect the properties of substances? | I | F, I | 3.4.12.A, 3.1.12.B |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Nomenclature
Essential Question for the Unit: What is the language of chemistry?

| **Unit Objectives/Key Questions** | | | |
|---|---|---|---|
| A. How are compounds containing two elements named? | E | F, C | 3.4.12.A, 3.1.12.C |
| B. How are acids named? | C | F, C | 3.4.12.A, 3.1.12.C |
| C. How are compounds containing polyatomic ions named? | E | F, C | 3.4.12.A, 3.1.12.C |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Chemical Equations and Reactions

Essential Question for the Unit: Why is it important to balance and classify chemical equations?

| **Unit Objectives/Key Questions** | | | |
|---|---|---|---|
| A. How are chemical equations balanced? | E | A | 3.1.12.A |
| B. How is a given chemical reaction classified? | C | G, A, C | 3.4.12.B, 3.1.12.A, 3.1.12.C |
| C. How are the products of a chemical reaction predicted from analysis of the reactants? | E | F, D | 3.4.12.A, 3.2.12.B |
| D. | | | |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Stoichiometry and Quantitative Chemistry

Essential Question for the Unit: How are problems quantitatively solved that involve chemical reactions?

| **Unit Objectives/Key Questions** | | | |
|---|---|---|---|
| A. What is a mole and how is it used in chemistry? | E | A, B, I | 3.1.12.A, 3.1.12.B, 3.1.12.D |
| B. How are quantitative problems solved that involve chemical equations? | I | I, B | 3.1.12.D, 3.1.12.B |
| C. How is the percent composition of a chemical reaction determined? | I | I | 3.1.12.D |
| D. What is the difference between empirical and molecular formula, and how are they determined? | C | F, J | 3.2.12.C, 3.4.12.A |
| E. | | | |
| F | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Gas Laws
Essential Question for the Unit: Why are gases so difficult to keep in a container?

| **Unit Objectives/Key Questions** | ' | | |
|---|---|---|---|
| A. What are the important units and conversions necessary for measuring temperature, pressure and volume? | E | B | 3.1.12.D, |
| B. What are the relationships between pressure, temperature, volume and the amount of a gas in a system? | E | F, A, B, D, J | 3.4.12.A, 3.1.12.A, 3.1.12.B, 3.2.12.B, 3.2.12.C |
| C. How are real gases and ideal gases the same / different? | C | F, B | 3.4.12.A, 3.1.12.B |
| D. | | | |
| E. | | | |
| F | | | |
| G. | | | |
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# *Elizabethtown Area School District*

Name of Course: Honors Chemistry Name of Unit: Gas Stoichiometry
Essential Question for the Unit: How do we predict the amount of gas produced or needed in a chemical reaction?

| **Unit Objectives/Key Questions** | | | |
|---|---|---|---|
| A. How does collecting gases through water displacement affect its properties? | I | J, C | 3.1.12.B, 3.1.12.C |
| B. How is gas stoichiometry the same/different than regular stoichiometry? | E | J, C | 3.1.12.B, 3.1.12.C |
| C. How can we relate the pressure, temperature, volume and number of moles of a gas? | E | J, C | 3.1.12.B, 3.1.12.C |
| D. | | | |
| E. | | | |
| F. | | | |
| G. | | | |

# *Elizabethtown Area School District*

## III. Course Assessments

Check types of assessments to be used in the teaching of the course.
(Provide examples of each type.)

_X_ Objective Tests/Quizzes
___ Constructed Responses
____ Essays
_X_ Reports
__ _ Projects
____ Portfolios
____ Presentations
____ Performance tasks
____ _____

____ Response Journals
____ Logs
____ Computer Simulations
____ Research Papers
____ Class Participation
____ Notetaking
__ _ Daily Assignments
____ Writing Samples
____ _____

Provide copies of common assessments that will be utilized for all students taking this course. Overall course/grade level standards will be measured by a common course assessment. Unit objectives will be measured on an ongoing basis as needed by the classroom teacher to assess learning and plan for instruction. List common assessements below and recommended date/time frame for administration (at least quarterly).

| Name of Common Assessment | When given? |
|---|---|
| 1. Final | End of semester |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |

# *Elizabethtown Area School District*

## IV. Expected levels of achievement

Current grading scale:

| | |
|---|---|
| "A$^{+}$" 98% - 100% | "C" 77% - 79% |
| "A" 95% - 97% | "C$^{-}$" 74% - 76% |
| "A$^{-}$" 92% - 94% | "D$^{+}$" 71% - 73% |
| "B$^{+}$" 89% - 91% | "D" 68% - 70% |
| "B" 86% - 88% | "D$^{-}$" 65% - 67% |
| "B$^{-}$" 83% - 85% | "F" 64% - 0% |
| "C$^{+}$" 80% - 82% | |

| PA Proficiency Levels |
|---|
| Advanced<br>Proficient |
| Basic<br>Below Basic |

Attach rubrics, checklists, or other documentation noting how levels of proficiency will be determined for common assessments. The following scoring documents have been developed for this course:

MOLECULE LAB SCORING

Ball and Stick structure 1 point each = 21 points
Dash Notation 1 point each = 21 points
Label w/ formulas 1 point each = 21 points
Label w/ names 1 point each = 21 points (bonus for on-level)
Bond types:
Pure covalent:
H-H ; O-O ; N-N ; C-C = 1 point each
Non polar covalent:
C-H = 1 point each
Polar covalent:
K-C ;O-H ; N-H ; C-N ; C-O ; C-Cl = 1 point each
Ionic:
Na-C = 1 point
Molecular polarity 1 point each = 21 points
Label Shapes 1 point each = 10 points
Linear: $H_2$ ; $O_2$ ; $N_2$ ; $CO_2$ ; KCN
Bent/Angular: $H_2O$
Pyramidal: $NH_3$
Tetrahedral $CCl_4$ ; $CH_4$
Triangular planar: $CH_2O$

TOTAL POINTS = 156 POINTS (HONORS)
TOTAL POINTS = 135 POINTS (ON-LEVEL)