Periodicity and You!

Annette Garcia

INTRODUCTION

When I first heard about the Houston Teachers Institute's Chemistry seminar, I was thrilled by the opportunity to integrate technology into my classroom. Until now I have used CRISS (Creating Independence through Student-owned Strategies) techniques as my primary method of conveying information. The Teachers Institute has given me the shove I needed to integrate technology. I now look forward to using the curriculum I have written in my classroom next year.

After two years of teaching in the inner city of Houston, there are a few things that I can say about the special needs of my students. There are many problems that face the student body with which I work. The first problem to which I cater is a language barrier. Most of my students are new immigrants with very limited English exposure or proficiency. The next problem facing my students is the disruption of their education. To elaborate, my students have often had to leave school for various reasons. The reasons range from simple lack of facilities to civil war in their home country. Another problem facing my students is the lack of time to do their homework. The vast majority of my students work one or two jobs in order to help support their families. Finally, many students have total culture shock; they simply do not understand the structure of education in this country.

With these hindrances in mind, I have developed lessons that attempt to meet the needs of my students. I have tried to design my curriculum to do three things:

1. To facilitate learning by appealing to the multiple learning styles of my students;
2. To provide access and training in the use of various technological resources;
3. And to allow for the creative process (as well as break the monotony) through the use of various pieces of software.

In my curriculum the first piece of technology that I will integrate is PowerPoint. This is a very simple piece of software that I can show the children how to use. The presentations that I have done with this curriculum will be used to give students an idea of what can be done. I will allow students time to learn how to build their own presentations. This initial exposure will give them the courage to tackle a more difficult piece of software, HyperStudio.

Another skill that I hope to instill in my students is the ability to use the World Wide Web. In particular, I will show the students how to use search engines such as metacrawler.com or yahoo.com. My ultimate goal is for the students to be able to perform independent research. This may allow the natural curiosity of some of my

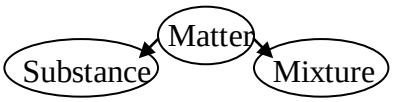
students to be satisfied rather than simply tossed aside as a "well, I don't know". I will also be incorporating interactive videos from Glenscoe into the lessons. I have also recently purchased a whole slew of laser discs from various companies. The rationale behind the use of the laser disc materials is visualization of chemicals in action. Visualization is an invaluable tool in conveying concepts to students, especially those who have a limited understanding of English.

BACKGROUND

The student must have an understanding of the following information. In order to understand my curriculum the student must know that physical science is the study of matter and energy. The student must also have knowledge of *matter*, anything that has mass and takes up space. This also includes the knowledge of *density*, unit mass divided by unit volume. Students should be able to calculate density as well as gather meaning from such calculations. Students should also be able to calculate the value of any of the three factors if you have the other two. The student must also have knowledge of the *four states of matter*; solid, liquid, gas, and plasma.

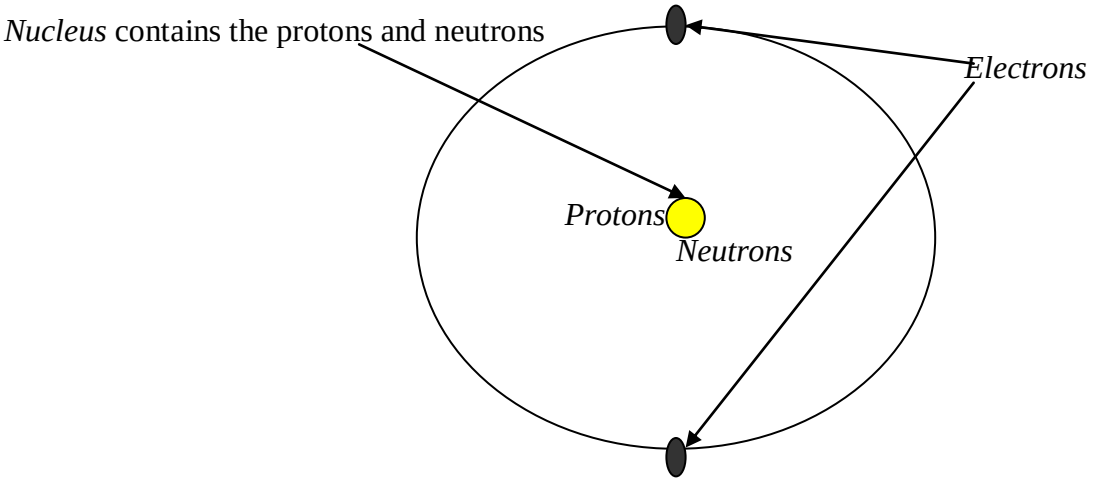
The students should know the *Kinetic Theory of Matter* and how it relates to the states of matter here on Earth. First, the kinetic theory of matter says that all matter is made up of tiny moving particles. How does this relate to the different states of matter? When in the solid state, particles move the slowest. The students should be able to relate this to examples around the room. Students should also be able to understand that this is the reason that the volume and shape of a solid does not change. In the liquid state, particles move faster than in a solid. The student should understand that this is why a liquid has a definite volume but no a definite shape. When matter is in its gas state, its particles move faster than in solids or liquids. Students should understand that this explains why gases have no a definite shape or volume. The students should be able to relate thermal expansion to the kinetic theory of matter. The hotter the matter, the faster it moves and the more space it takes up. The colder the matter, the slower it moves and the less space it takes up. The next piece of knowledge that the students must have is that there are two different kinds of matter. The two kinds of matter are substances and mixtures. The curriculum deals specifically with substances. *Substances* can be placed into two categories, elements and compounds. *Elements* are those substances that only have one kind of atom. *Compounds* are those substances that have two or more kind of atoms.

Information Covered by Curriculum



Once the students have reviewed the above information, they will be introduced to the theory of the atom. The *atom* is the smallest total part of matter. Even though the atom can be broken into more than three parts, it is important that the students understand that

the atom is the smallest piece of the whole. Atoms are the smallest particle of an element that has all of the chemical properties of the element. This is why one atom of zinc will still act like zinc but one proton from a zinc atom will not act like zinc. Atoms may be divided into three parts – the proton, the neutron, and the electron.



Protons are the positively charged part of the atom. Protons are located in the nucleus of the atom. Protons are about two thousand times heavier than electrons but relatively the same size of neutrons. The protons are the particles that determine the identity of the element. If an atom has two protons, that the atom is helium. Like protons, the neutrons of an atom are located in the nucleus. Unlike protons, *neutrons* have no charge (*neu*tral, *neu*tron). The last but most important part of an atom is the *electron*. It is by far the lightest of the three parts of the atom. The electron is the negatively charged part of the atom. The electrons are located outside the nucleus. Since the protons and neutrons are inside the nucleus, it has a positive charge. The negative charge of the electrons is attracted to the positive of the nucleus. The number of each of the three parts of the atom can be changed. Changes in any of these particles account for behavioral and structural differences. These differences are documented in the order and manner in which the elements are organized.

Demitri Mendeleev first organized elements in a form of the periodic table in the 1860s. He did this based on increasing atomic mass and similar properties. The Periodic table of today contains abundantly more information than originally envisioned by Medeleev. Here is the most common information listed on any PeriodicTable.

First, let us look at the *atomic mass*. Atomic mass is the total mass of the nucleus of an atom. As mentioned earlier, protons and neutrons are found in the nucleus, and are what determine the atomic mass. The atomic mass of an atom can vary. The number of neutrons in atoms of element can vary without changing the identity of the element. When a change occurs in the number of neutrons the atom created is called an isotope.

Isotopes are just atoms of an element that have fewer or more neutrons in their nucleus. In reality the mass of a proton is 1.0073 atomic mass units. The mass of the neutron is 1.0087 atomic mass units. The mass of the electrons is $5.486*10^{-4}$ atomic mass units. However, by looking at how close to one the average number of all the atoms is, it is reasonable to assume that the variants to the norm are in the minority. While all of this is nice, it was not the manner in which modern periodic tables would later be classified. It was the work of an English scientist, Henry G.J. Moseley, which in 1913 led to elements being placed in order or to their atomic number instead of their atomic mass. This is the second piece of information that all periodic tables have.

The *atomic number* is the number of protons that an atom contains. When the number of protons is changed in the nucleus of an atom, the element itself is changed. This number can also be used to signify the number of electrons in a neutral atom. Think of it in terms of sand on the beach. If you take out five scoops of sand you end up with a hole. How many scoops do you need to fill up that hole? The five scoops you took out are a charge of negative five that five electrons have. The five scoops of sand that you have to put back into the hole are like the protons (positive). Five scoops out and five scoops in will equal to a total charge of zero, therefore no hole. It was through this means of categorizing the elements that led to the emergence of other patterns. One such pattern was the behavior of certain groups of elements with structural similarities. By finally putting the elements in order by atomic number, new patterns were seen. Moseley also took properties of the elements in consideration when categorizing them.

In modern periodic tables each element has its own box with its specific information inside. The *chemical symbols* for each element are still by far the most identifiable maker of any periodic table. The question most asked by my students is "Why do scientist have to use the chemical symbols?" Simply put, Au is gold in English just like Au is *oro* (gold) in Spanish. I like to remind students about the "meter is a meter" everywhere in the world. Since most of the modern European languages were derived from Latin, scientists have often used abbreviations from the name of the element in either Latin or Greek. An example of this would be Fe, which is the chemical symbol for iron. The symbol came from the abbreviation for *ferrum*. Ferrum is Latin for iron.

The Organization of the Periodic Table

The Periodic Table of Elements is organized by increasing atomic number.
The horizontal groups are called periods. The columns are known as families. The families have similar chemical properties as well as the same number of valence electrons. *Valence electrons* are those electrons in the outer-most shell. These are the electrons that are responsible for if and how an element will react. The number of valence electrons increases as you go across the periodic table.

The first family, the *Alkali Metals* (Lithium descending) all have one valence electron. In the same column but not a member of the Alkali Metals is the element

hydrogen. Hydrogen is the element with the lowest atomic number. The next family, the *Alkali Earth Metals* (from magnesium descending), has two valence electrons. The elements in groups three through twelve are called the *Transitional Elements*; they have varying numbers of valence electrons. Another family is group eighteen, the *Noble Gases* (helium descending). The Noble Gases have full outer-most shells. This is to say that helium has two valence electrons and all the others noble gases have eight valence electrons. The family directly to the left of the noble gases is called the *Halogen Family* (fluorine descending). The halogens all have seven valence electrons. Group sixteen, the *Oxygen Family*, begins with oxygen and continues down the line. Group fifteen, the *Nitrogen Family*, begins with nitrogen and continues down the column. Group fourteen, the *Carbon Family*, begins with carbon and continues down the column. Group thirteen, the *Boron Family*, begins with boron and continues down the column.

All of the families are made up of three kinds of elements. The three kinds of elements on the periodic table are metals, nonmetals, and metalloids. All elements are one of three major categories. *Nonmetals* are all the elements that are brittle, dull and unable to conduct electricity with the exception of carbon graphite. *Metalloids* are those elements that have properties of both metals and nonmetals. *Metals* are all those elements that are usually solid, shiny, malleable, ductile and conduct electricity. There is one metal that is not in the solid state. Mercury (Hg) is in the liquid state at room temperature.

UNIT FORMAT

This unit will be presented in a day-by-day format. Each day will start with a warm-up exercise to fulfill your daily dose of TAAS (Texas Assessment of Academic Skills). Each day will also include a lesson plan that will go through each and everything that is to be done.
Note: The warm-ups I use usually focus on writing and critical thinking skills. I feel that it is important to make my students write as often as possible. You can use different math objectives but those congeal with the physics portion of the class. A good way to tie this into technology is to require that they type everything. I like to have them turn in certain warm-ups for a notebook grade. These can also be used as extra credit or as replacement grades.

Outline

Day 1: Matter, Atoms, and Particles
Day 2: Atoms and Changes in Their Particles
Day 3: Atoms: Ions and Isotopes
Day 4: Elements, What They Are and How They're Organized
Day 5: The Periodic Table and Energy Levels
Day 6: Periodic Table (How isotopes are related to the mass numbers. Atomic number and how it relates to the number of electrons)

Day 7: Periodic Table (How to calculate the number of protons neutrons and electrons)
Day 8: Valence Electrons and Oxidation Numbers
Day 9: Periodic Table (Valence electrons – losing and gaining, oxidation numbers)
Day 10: Oxidation Numbers and Energy Levels (How valence electrons can be donated or gained due to the energy level that they are in.)

DAY 1: THE HEART OF THE MATTER

Warm-up

Tell me what happens to a piece of ice when I leave it on a table in the room.
Use any of the following in your answer: Kinetic Theory of Matter, states of matter, solid, liquid, gas, particles, faster, slower, change, etc.

Topic

Understanding what matter is made of. Understanding the theory of the atom and its particles.

Materials Needed

Teacher: computer set-up, overhead, chalk, meter stick or other pointer.

Students: handouts, paper, pen, cardboard, proton game pieces, neutrons game pieces, and electron game pieces.

Student Prerequisite Knowledge

The student must have an understanding of the Kinetic Theory of Matter. The student must have knowledge of the different states of matter and how the Kinetic Theory of Matter relates to each state. The students must know what matter is and what it is not.

Lesson Objectives

1. Review the definition of matter.
2. Define the atom as the smallest particle of an element that still has the properties of that element.
3. Break an atom into its three parts and give a definition for each.
4. Structure of an atom (nucleus, electrons orbiting outside).
5. Present the different faces of an atom (Bohr Model, Electron Cloud Model).

Grouping of Students

Students are assigned seats that are subject to change. Students will work in-groups of two.

Lesson Focus

Presentation of the new material showed on either PowerPoint or HyperStudio. The students should be given a KWL[i] prior to starting the presentation. Students are then shown how to draw the traditional Bohr Model and the Electron Cloud Model. *Instructional Input*: Definitions of terms are given in Spanish. Lecture done in Spanish as needed. If they already understand a concept in English there is no point to go over it in Spanish.

Activity

The students start with very simple drawing. The students will place the protons, electrons, and neutrons where they go. I have cardboard atoms where the students can practice putting the game pieces in place.

Questions

Asking questions of the class before, during and after is essential to monitoring student understanding (or lack thereof). We begin with the simplest recall questions. What is matter made of? What is an atom? What are atoms made of? What charge does a proton have? Where are the protons found? What charge do the neutrons have? What charge do the neutrons have? Where do you find the neutrons? What charge do the electron have? What is the difference between the Bohr Model and the Electron Cloud Model?

Closure

Now that the students own the concepts I can have them do a concept map. In the end, the students will be able to fill in more to the learned section of their KWL.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 2: ATOMS AND CHANGES IN THEIR PARTICLES

Warm-Up

Draw a diagram of an atom. Label the parts and charges of each particle. Is this the only way to draw an atom? Explain the difference between the Electron Cloud Model and the Bohr Model.

Topic

Understanding the changes that take place in an atom. Understanding what effect changing any of the particles will have on the atom.

Materials Needed

Students will once again use the cardboard game board. This should already be on the tables this the pieces inside a Ziploc bag.

Student Prerequisite Knowledge

Students must understand what an atom is and of the particles that configure the atom. Students must also understand where the particles are in and around the atom.

Lesson Objectives

The students will explore the theory of the atom. Solidification of understanding is the main objective. The students will be able to draw and/or make any of the first 20 elements.

Grouping of Students

Students should be grouped according to table at the discretion of the teacher.

Lesson Focus

The teacher should guide the student through a review of the previous material. I use a concept map to show the relationships of the material. This will be a student-driven activity. The teacher should demonstrate the activity. Then directly afterwards, the teacher should assign each group an element. The students should then demonstrate the activity under the supervision of the teacher. The activity should then be completed by each person on the activity sheet and handed in.

Activity

The tabletop activity should be completed and submitted for grading.

Questions

What are atoms made of? What are the charges of the three particles? Draw diagrams of the following atoms:
1) C
2) F
3) Ne
4) P

Closure

Pop Quiz
1. What is an atom?
2. What are the particles that make up the atom? What are the charges of each?
3. Draw a diagram of one of the following elements: (+10 bonus if you do all three.)
   Na
   K
   Cl

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 3: ATOMS, IONS, AND ISOTOPES

Warm-Up

On a sheet of paper, explain the difference between changes in the number of protons, neutrons, or electrons of an atom.

Topic

Understanding that a change in the number of neutrons will create an isotope.
Understanding the two kinds of ions (positive and negative).

Materials Needed

White beans, black beans, ten Styrofoam cups. All of the cups should be numbered and prepared for the student. The white beans are protons and the black beans are the neutrons.

Classroom Exercise (30 minutes)

Teacher Prep1: 8 cups with 5 white beans and 6 black beans
2 cups with 5 white beans and 5 black beans
Teacher Prep2: 8 cups with 6 white beans and 6 black beans
1 cup with 6 white beans and 7 black beans
1 cup with 6 white beans and 8 black beans

Student Prerequisite Knowledge

Students must understand the structure of the atom and its particles.

Lesson Objectives

1. The students will learn about isotopes of two different elements.
2. The students will also be able to calculate the average atomic mass.
3. The students will learn what an ion is and what a few of them look like.
4. The student will learn to calculate the charge of different ions.

Grouping of Students

For this activity the students will be working independently.

Lesson Focus

I will give an overview of the presentation of the activity on either HyperStudio or PowerPoint. For this activity the students will have two groups of ten cups that represent ten nuclei of two different elements. The students will then calculate the mass average and estimate the identity of the two elements. The students will calculate the numbers using Excel. The activity will include entering data and then having the students use a spreadsheet to calculate the averages. Following this the students will identify the element.

Activity

Part 1. Students will participate in the classroom experiment.
Part 2. The students will work in the computer lab to finish the calculations and identifications of the isotopes. Afterwards the students will look up ions. What are

they? How they are calculated? The teacher will select a number of items students should find.

Questions

What is an isotope? Give examples of isotopes that occur in nature. Find five examples. What makes an isotope? What is an ion? What makes an ion?

Closure

Students will finish the experiment and turn it in. The students will have two school days to finish their search and turn in their printouts.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 4: ELEMENTS, WHAT THEY ARE, AND HOW THEY'RE ORGANIZED

Warm-Up

Students will draw a concept map using the terms listed below:

Matter	Neutron	Negative charge	Neutral charge
Atom	Electron	Proton	Positive charge

Topic

How the elements are organized in the Periodic Table.

Materials Needed

Laser disc player and Glenscoe laser disc set
Student handout
Computer lab
Students will look at several websites.

Student Prerequisite Knowledge

The students must be able to open and close Netscape. The students must be able to work with at least two search engines.

Lesson Objectives

1. Students will watch a program titled *Periodicity* about the organization of the periodic table.
2. Students will review how to open Netscape and move to a search engine. I will have the students look at different websites dedicated to periodic tables and the way that the elements are organized.

Grouping of Students

Students will be working alone for this activity.

Lesson Focus

First students will watch the disc and take notes. Next, the students will move to the computer lab.

Activity

There are two activities for this lesson. First the students will answer questions on the handout from the information on the laserdisc program. The students will be responsible for acquiring some of the information that the laserdisc does not give them. The students will search for the missing information.

Questions

The handouts have all the questions that the students should be able to answer.

Closure

Have the students answer some of the questions that were not answered by the laserdisc. These will be turned in for a grade.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 5: THE PERIODIC TABLE AND ENERGY LEVELS

Warm-Up

The students will identify the different energy levels and placement of electrons.

Topic

Energy levels and electron arrangement.

Materials Needed

Paper, pencil, and a dictionary.

Student Prerequisite Knowledge

The students should already know the information from the previous four days.

Lesson Objectives

The objectives for today's lesson are 1) understanding what an energy level is and 2) how many electrons are in each level.

Grouping of Students

Students are to work alone. If you feel that your students can be trusted to work in groups without turning the lesson into a social gathering, group note taking can be done. (*Group note taking:* sharing the duty of gathering information among three to four people.) The students then share the notes among the group to gather a complete day's information.

Lesson Focus

The lessons will begin with an overview of the structure of the atom. Next, the students will review what isotopes and ions are.

Activity

The activities of today will consist of a lecture and question-and-answer session. Students will be allowed time to research any of the topics that we have already covered.

Questions

How many electrons are in the first energy level? Second? Third? What happens to the amount of energy in each energy level the further you get from the nucleus?

Closure

Question-and-answers session. A KLW worksheet is handed out for the students to fill out. I would like my students to use the Internet to investigate the subjects in the "what

do I **w**ant to know" portion of their KLW. The students should begin to look to the Internet as a source of information.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 6: PERIODIC TABLE (How isotopes are related to the mass numbers. Atomic numbers and how it relates to the number of electrons)

Warm-Up

How many energy levels do each of the following elements have?

Chemical symbol	Energy levels
Fe	
Ne	
C	
H	
K	
Sn	
Ge	

Topic

Isotopes and their relationship to mass number. The students should be able to interpret the average atomic mass of an element. The students will learn to extrapolate information from the periodic table.

Materials Needed

A copy of the Periodic Table of Elements. The table must have all of the following: atomic number, atomic mass, energy levels, and family names. The teacher should have their computer set up to answer any questions that the students have using the Internet.

Student Prerequisite Knowledge

The students must be able to access the Internet and be able to search for information. The students should already have a grasp of the information that has proceeded.

Lesson Objectives

1. The students will be given the following information:

a. Atomic number: the number of protons
b. Atomic mass (a.k.a. mass number): the number of protons and neutrons
c. Number of protons = number of electrons (neutral atoms)

2. The students will be given the family names as they appear in the textbook.

Grouping of Students

Grouping of students will be left to the teacher's discretion. I like to have the students work in groups no larger than two people.

Lesson Focus

The students will start the class period with a class warm-up activity. They should be given about 15 to 20 minutes to work on the question. Next, they students will watch a presentation. During the lecture there will be interludes where the teacher and student go through a process of clarification. For instance, near the end of a topic the teacher should give the student the opportunity to do an activity while still able to ask for help. This is the activity that I like to do in order to lead to the students doing the activity independent of the instructor.

Activity

The students are given an outline of the notes prior to the beginning of the class. This will allow the lecture to have the desired effect rather than just a note-taking frenzy. The teacher should also be ready to answer any questions that the students have using the Internet. This should be the last ten minutes of class.

Questions

1. What is an atomic number?
2. What is a mass number?
3. How do you calculate the number of neutrons?
4. What kind of information can you get from the periodic table?
5. What are energy levels?
6. What are valence electrons?

Closure

Have the students take out a sheet of paper; it's quiz time.

1. What does the atomic number signify?
2. How many protons and neutrons do the following elements have?
   a. C b. Sn c. Cl d. Ar e. Zn f. K
3. What does the atomic mass (mass number) signify?

4. What are the energy levels for the following?
   a. C b. Sn c. Cl d. Ar e. Zn f. K

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 7: PERIODIC TABLE (How to calculate the number of protons neutrons and electrons)

Warm-Up

Take out a piece of paper! This TAAS writing task will have the students answer the following prompt in a paragraph. What are some advantages to having the elements grouped in a periodic table?

Topic

Calculating the number of protons, neutrons, and electrons.

Materials Needed

Periodic table, handouts, computer lab, and calculator. Computer lab time, about 45 minutes to one hour, is the last thing that you will need.

Student Prerequisite Knowledge

The students need to understand how to interpret the information contained on the periodic table. The students should already know that if you know the number of protons then you know the number of electrons (if the atom is neutral).

Lesson Objectives

1. The instructor will show the students a presentation dealing with how to calculate the proton, neutron and electron numbers.
2. A basic mathematical review might be necessary, negative and positive numbers in particular.

Grouping of Students

Students may work alone or in-groups of two. For the computer lab portion of the lesson, the students should work alone.

Lesson Focus

The instructor will begin the mathematics review of adding and subtracting negative and positive numbers. The first activity should only take about ten to 15 minutes. Following the math review the teacher will lead the students through a presentation of the day's information. There should be periodic breaks for student to ask questions and perform the new activity.

Activity

Today's activity is the ability to calculate the number of protons, neutrons, and electrons of any element. The students should be able to accomplish task using the information contained on the periodic table of elements.

Questions

What does a periodic table do? How do you calculate the number of protons, neutrons and electrons?

Closure

The students are to finish their handouts. There will be a few questions that are not answered by the presentation. The students can work together on these questions.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 8: VALENCE ELECTRONS AND OXIDATION NUMBERS

Warm-Up

The students will complete the TAAS Practice Number Six. This should take about ten minutes.

Topic

Calculating oxidation number for elements in different families and the valence electrons that are responsible.

Materials Needed

TAAS handout and a calculator. After they have finished the activity the students will be presented with a short review session. I like to verbally go over all the pertinent material leading up to the day's new information.

Student Prerequisite Knowledge

The students must have a working understanding of the periodic table and the information that it contains. The students must know how to add and subtract negative and positive numbers.

Lesson Objectives

The students will learn what valence electrons are, where they are located and what they do. The students will gain an understanding of how to calculate the oxidation number of an element by seeing how many valence electrons it has. The student should also understand that the number of valence electrons is a property shared by elements in families.

Grouping of Students

Grouping of the students will be left to the teacher's discretion. I would suggest that they work in-groups of four with a game board that should be set by the teacher before class (or an illustration of the board can be substituted).

Lesson Focus

The students will be lead through the definition of valence electrons. The students will then be given the opportunity to work with the cardboard atoms that should be set up prior to class by the instructor. There should be anywhere from 45 minutes to an hour to look at different periodic table websites. This will allow the student to explore the different aspects of the periodic table.

Activity

The first activity is the TAAS handout. It should be turned in ten minutes after the ringing of the tardy bell. The next activity, the lecture, should take about 20 minutes depending on how many questions your students have. The last activity is to be done using the computer lab. Giving the students time in the lab will allow them the opportunity to research the topics we have been studying. However, it is important to have a back up plan just in case the students are not cooperative. (I like to have a worksheet that is impossible for the students to do with just their textbook. If my students feel the need to socialize rather than using their time in a productive manner I have a

worksheet that I can use to motivate them. This worksheet can also be used as an extra credit assignment.)

Questions

Fill in the following information for the following elements.

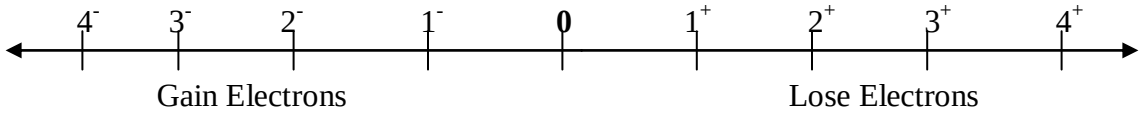
Elements	Protons	Neutrons	Electrons	Oxidation #	Valence E¯s
Cs					
Ca					
He					
Si					
B					
Cl					
O					

Closure

The students should be able to fill out the box above. If there are any students still having difficulty, arrangements should be make to get them tutoring or other help.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 9: PERIODIC TABLE (Valence electrons – losing and gaining, oxidation numbers)



Topic

Losing and gaining valence electrons

Materials Needed

The atom game board and game pieces. The instructor prior to the beginning of class should set up each game board. I suggest that each game board be set up differently.

Student Prerequisite Knowledge

The students must be able to associate the protons with a positive charge and associate the electrons with a negative charge. The students must understand that a change in the number of electrons result in a change in the charge of the atom.

Lesson Objectives

1. Understanding that atoms can have a charge.
2. Understanding what an oxidation number is and what it means.
3. Being able to calculate the oxidation numbers of atoms.

Grouping of Students

The students will work in groups of two or three.

Lesson Focus

The focus of today's lesson should be on the ability to calculate oxidation numbers and to interpret their meaning.

Activity

The class will start off with a concept mapping activity using the terms that we have worked with the last few days.

Questions

What are oxidation numbers? What is the difference between a negative oxidation number and a positive oxidation number?

Closure

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

DAY 10: OXIDATION NUMBERS AND ENERGY LEVELS (How valence electrons can be donated or gained due to the energy level that they are in)

Warm-Up

First ten minutes of class. Give the students a handout of the class assignment. The assignment will require students to do two activities that will require the use of the computer lab. The instructor will show how the activities are done.

Topic

The relationship between valence electrons and the energy level they occupy. The effort required to lose or gain electrons is related to the energy level the valence electrons occupy.

Materials Needed

The teacher will require a computer set up with Excel and Internet capability.

Student Prerequisite Knowledge

The students will need to know how to work with Excel and one of the web browsers. The students will also know what valence electrons are. The students must also know how to calculate oxidation numbers.

Lesson Objectives

1. Understanding that there is a relationship between valence electrons and the energy level they occupy.
2. Associating energy level with the energy required to remove electrons.

Grouping of Students

Students will be able to work alone or with one other person.

Lesson Focus

The lesson will begin with the warm-up exercise and its explanation. The instructor will show the students how to work with a spreadsheet. There should be a little question and answer session and time for the students to take notes. The instructor will show the students how to find the answer to the example question on the worksheet.
The new information can be presented in a PowerPoint or HyperStudio presentation. The students will now be given the second handout. The students will have to find the oxidation numbers of the given elements. The students will then complete a concept map

with the terms listed on the worksheet. The students will also be expected to draw relationships between some of the terms.

Activity

The activity for today in class is the warm-up. The next activity the students will do is finish off the other activities.

Questions

What are the different family names? What are the oxidation numbers of the following elements: silicon, nitrogen, calcium, and bromine.

Closure

The students will be given ten minutes at the end of class to ask any questions or clear up any misunderstandings.

Journal entries must be done on a word processing program like Microsoft Word, Claris Works, or WordPerfect. Today's journal entry should answer the following questions, "What did I learn today? What did I not understand about today's lesson?" Specify to the students that blanket statements like "everything" are not acceptable.

ENDNOTES

[1] See attachment for copy of the **KWL**. (What do you **K**now? What do you **W**ant to know? What have you **L**earned?)

BIBLIOGRAPHY

Bednarczyk, John L. *Laboratory 9.* Non-published. Houston: 1999.
Dr. Bednarczyk is an experienced researcher who decided to work with inner city youth. He has twenty years immunological research under his belt and it shows. The labs that Dr. B writes are useful to every level of student. His labs are interesting and thought provoking. The students are able to understand the concepts and are able to perform many of the tasks on their own. Thanks to Dr. B, I finally have labs that the students both understand and like.

Kotz, John C. and Keith F. Purcell. *Chemistry and Chemical Reactivity*. 2nd ed. Fort Worth: Harcourt Brace Jovanovich College Publishers, 1991.
The importance of this source is obvious, resource material. I like this text and find it useful in that capacity. This textbook has many useful pictures and diagrams. Pictures and diagrams are at the heart of my lessons. When the students that you teach are LEP and ESL students, pictures are very important. I use the Harcourt text in to

supplement four areas. I use copies from this text on subjects of periodic table overview, oxidation numbers, family groups, and chemical properties of families to the advantage of my students.

McLaughlin, Charles W. and Marilyn Thompson. *Glencoe Physical Science.* Texas Edition. New York: McGraw-Hill, 1997.
This is my classes' textbook. It is the reference that I will use most. This textbook is where the majority of the presented information will come from. I use this textbook for the illustrative manner in which it presents information. The importance of the textbook is the frequency in which it will be used. The students will be required to have this text and use is on a daily basis.

Santa, Carol M., Lynn T. Havens, and Evelyn M. Maycumber. *Project CRISS-Creating Independent Student-owned Strategies.* 2nd ed. Dubque, Iowa: Kendal/Hunt Publishing Company, 1988.
The Project CRISS material was a godsend my first year. I have found that the strategies in the Project CRISS manual work with my student body. The activities help students organize their thought and information in meaningful ways. The students are able to own their work in a way that I never did as a student.

TLTG. *Interactive Videodisc Program.* 2nd ed. New York: McGraw Hill, 1997.
A company by the name of TLTG prepared this laserdisc program. The specific authors of the program were not listed individually. This program is one of the most enriching portions of the curriculum. The students have a handout, provided by Glencoe, that follows the laserdisc. The program discusses the new vocabulary and provides live action shots of the vocabulary covered. The students are then shown the reactive properties of one of the families discussed on the laserdisc. The demonstrations are then followed with a full explanation of the properties seen in this family. The importance lays in the fact that due to new safety guidelines the use of some of the chemicals used in the program would be impossible.

Web Sites

www.metacrawler.com
The students will use this site to do research over the topics presented during the course of the year. The students will be able research the things that I am not covering in depth. They can also research those things that we are not covering but they would like to learn about. Learning how to use a search engine is a very important first step into a broader universe.

www.chemicalelements.com
The students will use this site to familiarize themselves with the workings of the periodic table. The students will have several assignments that can be done much more easily with the help of this site or another site dealing with the periodic table.

http://periodictable.com

This site like the one before it can be used to familiarize the student with the workings of the periodic table. The students can use these sites to help them to finish homework in a more expedient manner or just to learn something.

www-tech.mit.edu/Chemicool

This site is one of the most useful. It is very important to have a site the students can recognize how to use. In the past this site has always been very popular with my students and some of my fellow instructors. It is colorful and very user friendly.
