UNIT – CONCEPTS: **PROPERTIES OF MATTER – Law of Conservation of Mass, Physical vs. Chemical Change**

SUMMARY – This unit takes students on a journey through chemistry and provides them with a basic understanding of the particles of matter, the Periodic Table, chemical reactions, and the Law of Conservation of Mass. The unit includes content material, lab demonstrations, chemical reaction experiments, and writing and balancing chemical equations. Content can be introduced and explored through chemical equations and balancing and then reinforced with lab demonstrations and experimentation. Another teaching option is to incorporate various demonstrations and experiments while the content is being taught. The learning style of the students will dictate which direction to approach the material in this unit. It is presented here with all content objectives followed by appropriate lab demonstrations and experiments. The goal of this unit is for students to gain an understanding of how particles react with one another to form new substances; how these reactions can result in physical and chemical changes; and how matter can be changed into energy (and vice versa). The concepts explored in this unit will be reinforced throughout the 8th grade curriculum as students apply basic chemistry concepts to Changes over Geologic Time (e.g., carbon dating, radioactive decay, formation of Earth and life), Cell Theory and Microbiology (e.g., substances that generate and sustain life, microbial diseases, mutation), and Hydrology (e.g., water chemistry, water quality, biogeochemical cycles).

TARGET AUDIENCE – Middle School Science and Math

LESSON SEQUENCE –

I. Atoms and Bonding; Using the Periodic Table of Elements
II. Writing Chemical Formulas and Equations
III. Balancing Chemical Equations and the Law of Conservation of Mass
IV. Physical and Chemical Properties of Matter
V. Physical versus Chemical Reactions (Lab demonstrations and Experimentation)

WEB RESOURCES – The following websites are accessed during this activity:

- www.chem4kids.com
- www.chemicalelements.com
- www.webelements.com
- www.chemicool.com
- www.dun.org/sulan/software/trial/chem1/chemBalancer/default.htm

LESSON: Atoms and Bonding; Using the Periodic Table of Elements (5 days of instruction)

SUMMARY – This section builds on the 7th grade review of atoms and the Periodic Table and takes them through three types of chemical bonds. Students will become familiar with the Periodic Table and learn to use the table to identify elements that are most likely to bond ionically, covalently, or metallically. This section provides the framework needed for students to succeed during the remaining sections of this unit.

KEY CONCEPTS – The concepts explored in this lesson include:

- Particles of matter that comprise an atom
- Formation and organization of the Periodic Table
- Three types of chemical bonds
- Valence electrons and oxidation numbers

OBJECTIVES – Students will:

- Use the Periodic Table to locate characteristic information about the elements.
- Complete study guides and worksheets to assist locating information on the Periodic Table.
- Use computer and research skills to create an Element Poster for class use.
- Use computer skills to complete a web quest that introduces the chemistry unit.
- Determine which elements are most likely to form ionic, covalent, or metallic bonds.

MATERIALS –

- Element Poster Rubric and Design (see Fe – Iron poster example in Properties of Matter folder)
- CHEM4KIDS Web Quest (filed in the Properties of Matter folder)
- Periodic Table Practice Worksheet (filed in the Properties of Matter folder)
- Periodic Table Quiz (filed in the Properties of Matter folder)

PROCEDURES –

PRIOR to DAY ONE: The following outline represents the material that should be covered during this section.

DAY ONE and TWO: Introduction to the Properties of Matter

I. (OPTIONAL) **CHEM4KIDS Web Quest** - Students complete the CHEM4KIDS web quest using the www.chem4kids.com website.

II. Use the completed web quest to introduce students to the Properties of Matter unit. Explore parts of the web quest that students find interesting.

I. (OPTIONAL) **Element Poster** – Students will follow a rubric and use www.webelements.com to create a 9x12 poster highlighting important information about one element from the Periodic Table. (Select most commonly used or occurring elements to assist with classroom transfer during later discussions and activities.)

II. Use the completed posters in student-led explorations to discern similarities and differences among the various elements.

DAY THREE through SIX: (daily progress will be determined by the learning levels of the students in each class)

I. Atoms – Elements – Bonding - The Periodic Table

a. Everything is a form of matter and matter is made of tiny particles called **atoms**.
b. **Atoms** are the basic building blocks of all substances in the universe. The simplest substances are elements.
   i. 109 different elements (see text, page 242 - 243)
      1. 18 families of elements
      2. 7 periods of elements
   ii. Atoms of elements combine to form all types of substances called compounds (e.g., H_2O = hydrogen + oxygen = water; NaCl= sodium + chloride = salt)
c. **Chemical bonding** = ***combining*** of atoms of elements to form new substances
   i. Rules of Chemical Bonding are determined by structure of the atom
      1. Atom contains a positively charged nucleus (or center)
      2. Small particles inside the nucleus = protons(+) and neutrons (no charge); therefore, nucleus = +charge
      3. Small particles outside the nucleus = electrons(-)
         a. electrons cannot enter the nucleus but they form a cloud around the nucleus by various energy levels
            i. energy level 1 can hold up to 2 electrons
            ii. energy level 2 can hold up to 8 electrons
            iii. energy level 3 can hold up to 18 electrons; the outer level
         b. the outer energy level contains the **valence electrons** = the most significant in determining how the atoms will combine
   ii. If valence electrons are complete, atom is stable and will not form a chemical bond
   iii. Three different types of bonds: Ionic, Covalent, and Metallic (also polyatomic ions)
d. **Ionic Bonds** (p.16) = ***transferring*** of electrons from one atom to another
   i. One atom gains electrons and the other atom loses electrons
   ii. A charged atom becomes an **ion**; remember, atoms are neutral until charged by this transfer process
   iii. The negative and positive charges no longer balance (i.e., in an atom, the charges balance; in an ion, the charges no longer balance and may be negative ions or positive ions
      1. if the atom gains electrons = a negative ion
      2. if the atom loses electrons = a positive ion
   iv. Ionization energy varies with the atoms' valence (outer) electrons
      1. few valence electrons = low energy = lose electrons easily (less energy to hold onto electrons)
      2. many valence electrons = high energy = hard to lose electrons; more likely to gain (more strength to pull other electrons away)
      3. attracting electrons = **electron affinity** (they develop a liking for one another)
   v. Ions of opposite charge; a negative and a positive = attract each other
   vi. Ions of like charge; a negative and a negative or a positive and a positive = repel each other
   vii. Ionic bonding = formation of crystals
      1. each ionic compound has a characteristic crystal lattice
      2. crystal lattice (p.19) gives the ionic compound stability

3. shape of crystal lattice is important to geologists in identifying minerals; there are more than 2000 different minerals

e. **Covalent Bonds** = **Sharing** electrons between atoms
   i. Positively charged nucleus attracts negatively charged electrons to be shared
   ii. Electron-dot diagrams illustrate electron sharing
   iii. Combination of atoms formed by a covalent bond = **molecule**
      1. a molecule is the smallest particle of a covalently bonded substance that has all the properties of that substance (i.e., 1 molecule of water has all the characteristics of a full glass of water or a pool of water)
      2. if a molecule is broken down into the atoms of its elements, the atoms would not have the same properties as the molecule. Remember, the atoms are sharing molecules.
      3. use chemical formula to represent molecules
         a. subscript numbers in the lower left show the number of atoms in each element
         b. if there is only one atom of an element, the subscript 1 is not written; it is understood to be 1 (e.g., HCl_4 = one atom of Hydrogen and 4 atoms of chlorine)
   iv. Melting points for covalently bonded solids
      1. some have low melting points
      2. some have high melting points if they contain very large molecules
         a. the molecules are large because the atoms continue to bond to one another
         b. these types of substances are called **network solids** (e.g., graphite from carbon and certain glues)

f. **Polyatomic Bonds** = covalently bonded atoms that act like a single atom when they bond with other atoms
   i. Usually, two covalently bonded atoms combine to form an ionic bond with other atoms
   ii. Common examples are found on chart

g. **Metallic Bonds** = characterized by **free-moving electrons** that are attracted by the nuclei of the atoms in a metallic crystal
   i. Metals are elements that give up their electrons very easily
   ii. The sea of mobile electrons keeps the metals malleable: able to be hammered into thin sheets without breaking
   iii. The sea of mobile electrons keeps the metals ductile: able to be drawn into thin wire
   iv. Metals are excellent conductors of heat and electricity and have a high melting point (e.g., melting point of silver = 961.9 degrees C; gold = 1064.4 C)

II. Predicting the type of bond that will form

a. Most important factor in predicting is the number of valence electrons
b. The placement of the elements in the periodic table often indicates the type of bond (e.g., notice the elements at the left and center of the table = metals; hence, metallic bonds)
c. Elements that lose electrons easily or gain electrons readily tend to be ionic
d. **Electron affinity** is the term used to describe the tendency for atoms to lose or gain electrons. Atoms with large numbers of valence electrons have high electron affinity; atoms with few valence electrons have low electron affinity.
e. Elements that have similar tendencies to gain electrons and bonds between nonmetals will be covalent

PROCEDURES for ASSESSMENT: The following may be used to assess this section of the unit:

- Periodic Table Practice Worksheet followed by Periodic Table Quiz.
- Element Poster (see rubric for grading)
- CHEM4KIDS Web Quest

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LESSON: Writing Chemical Formulas and Balancing Chemical Equations (15 days of instruction)

SUMMARY – In this lesson, students use their knowledge of bonding and the Periodic Table to construct chemical equations. Oxidation numbers will be explored and used to write correct chemical formulas. Ionization will be observed using chemical formulas of ions. Students will also learn about diatomic molecules and the use of subscripts to denote changes in the chemical structure of the new substances. Students will also construct chemical equations to illustrate four types of chemical reactions. (This lesson may be too challenging for low-level learners. Opt to demonstrate balancing equations based on the Law of Conservation of Mass with low-level learners and use equations to assist identification of four types of chemical reactions rather than hands-on balancing activities.)

KEY CONCEPTS – The concepts explored in this lesson include:

- Oxidation numbers, ions, reactants, products, chemical reactions, Law of Conservation of Mass, synthesis, decomposition, single displacement, double displacement

OBJECTIVES – Students will:

- Use their knowledge of the Periodic Table to determine oxidation numbers for chemical compounds.
- Use math skills to calculate oxidation numbers between elements in a compound.
- Use electron-dot diagrams to illustrate the number of atoms needed in a chemical bond.
- Use chemical formulas to construct chemical equations representing four types of chemical reactions.
- Differentiate between four types of chemical reactions.

MATERIALS –

- Periodic Table
- Chemical Bonding and Formulas Worksheet
- Chemical Equations Worksheet

PROCEDURES –

PRIOR to DAY ONE: Students should have successfully completed the previous lesson sequence (**Atoms and Bonding; Using the Periodic Table of Elements**).

DAY ONE through FIVE: Using the Periodic Table and Electron-dot diagrams to determine oxidation numbers, write chemical formulas, and determine the type of bond.

I. **Charting Oxidation Numbers** Worksheet
   a. **Oxidation number** = the number of electrons an atom gains, loses, or shares when it forms chemical bonds
   a. describes an atoms combining capacity
   b. use these numbers to predict how atoms will combine and what the resulting compound will be

c. Group number begins the process of determining oxidation numbers:
    i. Group 1 valence = 1; needs to lose 1 electron; leaves the atom with more protons (+) and becomes positively charged ion.
    ii. Group 2 valence = 2; also needs to lose and becomes 2+ charged as an ion.
    iii. Group 15 valence = 5; needs to gain 3 electrons; leaves the atom with more electrons (-) and becomes negatively charged ion.
    iv. Group 16 valence = 6; also needs to lose and becomes 2- charged as an ion.

II. **Bond Identification and Chemical Formulas** and **Bonding and Chemical Formulas** Worksheets - Guided Practice with Electron-dot diagrams
a. Draw electron-dot diagrams for atoms from groups 1 or 2 with groups 15, 16, or 17 to provide students with several examples of elements involved in ionization.
b. Use electron-dot diagrams to illustrate the number of atoms needed in each new compound.

III. SCIENCE TEST: Chemical Bonding and Writing Formulas

DAY FIVE through FIFTEEN: Chemical Reactions

I. Chemical Equations and Reactions Worksheet (without balancing equations component)
a. Types of chemical reactions (billions of different chemical reactions)
    i. **Synthesis**: two or more simple substances combine to form a new, more complex substance (A + B → AB)
    ii. **Decomposition**: a complex substance breaks down into 2 or more simpler substances (AB → A + B)
    iii. **Single-replacement**: uncombined element replaces an element that is part of the compound (AB + C → AC + B)
    iv. **Double-replacement**: different atoms in two different compounds replace each other (AB + CD → AC + BD)
b. Chemical Reactions: a process in which the physical and chemical properties of the original substances change as new substances with different physical and chemical properties are formed.
c. Characteristics of chemical reactions
    i. Always results in the formation of a new substance
        1. **Reactant** = substance that enters into the chemical reaction
        2. **Product** = substance that is produced by the chemical reaction
    ii. Always involves a change in energy; either absorbed or released
d. Arrangement of electrons in an atom determines the ease with which the atom will form chemical bonds: known as **bonding capacity**.
    i. Atoms with outermost energy levels (of valence electrons) completed will not bond with other atoms
    ii. Atoms with outermost energy levels incomplete will bond with other atoms
    iii. Bonding capacity of an atom determines its ability to undergo a chemical reaction with produces various effects:
        1. Bonds may be broken
        2. Atoms may be rearranged
        3. New bonds may be formed
e. Energy of chemical reactions
    i. Energy is always involved in chemical reactions

ii. Energy is either released or absorbed
    1. Exothermic energy = released (in the form of heat and light) (Ex.; fire cracker)
    2. Endothermic energy = absorbed (Ex.; cooking)
iii. Activation energy = the amount of energy used during the reaction to form the product

f. Rates of Chemical Reactions
    i. The rate, or amount of time, at which the reaction occurs
    ii. Rate of reaction is determined by five factors which are summarized under the Collision Theory:
        1. **Concentration**: amount of substance in a given unit of volume
            a. concentration can be diluted or left at full strength
            b. increased concentration = faster reaction time
            c. decreased concentration = slower reaction time
            d. Example:
        2. **Surface area**: how much of the material is exposed
            a. surface area can be increased by breaking solids into smaller pieces; increases the collisions between reacting particles
            b. increased surface area = faster reaction time
            c. decreased surface area = slower reaction time
            d. Example: sawdust reaction to fire vs. a log's reaction (O_2 particles from air can collide with more wood particles per second to increase combustion of fire throughout the material)
        3. **Temperature**: temperature is a measure of the energy associated with particle motion; particles are always in motion
            a. temperature increases yield more movement in particles and more collisions between reacting particles while temperature decreases slow this movement and collisions
            b. increased temperature (hotter) = faster reaction time
            c. decreased temperature (colder) = slower reaction time
            d. Example: boiling water to increase reaction in pasta
        4. **Catalysts**: used to increase reaction rate but not lost during the reaction
            a. catalyst is not changed by the reaction
            b. catalyst can be recovered at the end of the reaction
            c. Example: digestive enzymes used to assist the digestive process
        5. **Inhibitors**: use to slow reaction rate
            a. May slow down or stop the reaction
            b. Example: preservatives used to slow the growth of bacteria or fungi in food

II. Chemical Equations and Reactions Worksheet (with balancing equations component)

a. Chemical equations = using symbols to represent elements and formulas to represent compounds in a chemical reaction
    i. + means "and"
    ii. -> means "yields" (or results in; it replaces the = sign and shows the direction of the chemical change
    iii. Law of Conservation of Mass

1. Mass cannot be lost or gained in a chemical reaction; the number of atoms remains the same
2. The number of atoms of each element must be the same on both sides of the equation

iv. Steps to balancing equations:

1. Check each element to be sure that the same number of atoms are indicated on each side of the equation.
2. If the number of atoms match on both sides of the equation, do not add coefficients.
3. If the number of atoms do not match on both sides of the equation, add coefficients in front of the atoms on either side of the equation to make each atom match.
4. In this example, $CaCl_2 + O_2 \rightarrow CaO + Cl_2$, oxygen (O) is represented with 2 atoms on the left side of the equation but only 1 on the right side of the equation. To balance this, add a coefficient of 2 in front of the compound with oxygen in it on the right side (CaO).
5. Balancing the oxygen using 2CaO also changed the balance of calcium. In order to balance calcium on both sides of the equation, place a coefficient of 2 in front of the compound containing calcium on the left side ($CaCl_2$).
6. Balancing calcium using $2CaCl_2$ also changed Cl_2. To balance chlorine on both sides, add a 2 in front of the Cl_2 on the right side ($2Cl_2$). Now the equation is balanced with the same number of atoms represented on each side of the equation.
7. EXAMPLE: $2CaCl_2 + O_2 \rightarrow 2CaO + 2Cl_2$
8. Check your work by counting atoms of each element

III. Converting Chemical Equations to Chemical Formulas Worksheet
IV. Balancing Chemical Equations on-line: (www.dun.org/sulan/software/trial/chem/chemBalancer/default.htm)
V. Chemistry Test Preparation Worksheet
VI. SCIENCE TEST: Properties of Matter

PROCEDURES for ASSESSMENT

SCIENCE TEST: Chemical Bonding and Writing Formulas
Chemistry Test Preparation Worksheet
SCIENCE TEST: Properties of Matter

LESSON: Inquiry Investigations of the Properties of Matter

SUMMARY – This lesson sequence allows students to explore the basic properties of matter through inquiry investigations approved for middle school science and assists students in making the chemical connections with everyday reactions. Students will complete a chemical experiment and then demonstrate their procedures and results to the class. During the 5-day lesson, students will select an experiment from pre-approved chemistry labs, complete a lab sheet to organize their experiment and demonstration, complete the experiment with their partner, design and complete a lab demonstration with their partner, research real-world applications for the concepts and properties of matter explored in their lab. The labs are designed for partners of 2 or 3 students and can be completed at home or in the classroom using routine household items.

KEY CONCEPTS –

- Properties of matter, law of conservation of mass, experimental design, physical and chemical changes, chemical bonds

OBJECTIVES – Students will:

- Use lab safety rules during a class demonstration of an inquiry investigation.
- Experimental design to investigate various properties of matter.
- Identify different properties of matter observed during lab demonstrations conducted during class.
- Use higher-order thinking skills to describe the chemistry associated with everyday chemical reactions.

SCENCE STANDARDS and OBJECTIVES - **COMPTENCY GOAL 4:** The learner will conduct investigations and utilize technology and information systems to build an understanding of chemistry.

- 4.02
- 4.03
- 4.04 4.04.1 4.04.2 4.04.3 4.04.4 4.04.5
- 4.05 4.05.1 4.05.2 4.05.3 4.05.4 4.05.5

Evaluate evidence that elements combine in a multitude of ways to produce compounds that account for all living and nonliving substances.

- Identifying the properties of elements
- Described the suitability of materials for use in technological design:
- Electrical Conductivity Density
- Magnetism
- Solubility
- Malleability
- Identify substances based on characteristic physical properties:
- Density Boiling/Melting point Solubility
- Chemical reactivity Specific heat

MATERIALS – Miscellaneous household chemicals will be needed for the lab demonstrations, including:

- Ammonia
- Apples
- Antacid tablets
- Baking powder
- Baking soda
- Bananas
- Batteries (D-cell)
- Bubble wrap
- Cornstarch
- Coke & Diet Coke
- Eggs
- Iodine solution
- Jam (blackberry)
- Lemons
- Light bulb(holiday)
- Magnets
- Milk of Magnesia
- Ocean Water
- Paper clips
- Pennies
- Salt
- Shampoo
- Soap

- Spaghetti (various types and widths)
- String
- Sugar
- Vinegar
- Water
- Wire

EQUIPMENT – The following lab equipment will also be needed for the lab demonstrations:

- Beakers
- Spoons
- Syringes (small/large)
- Tweezers
- Stopwatches
- Baggies
- Hammer
- Aquarium
- Safety Goggles
- Measuring Spoons
- Large Stirring Spoon

PROCEDURES –

PRIOR to DAY ONE: Students should have prior experience with lab equipment and safety procedures. A working knowledge of the properties of matter and chemical bonding will also be helpful prior to the completion of this lesson. Students should have prior knowledge of the basic properties of matter, including: mass, volume, density, heat and energy exchange, thermal and electrical conductivity, state of matter, solubility, ductility, and malleability.

DAY ONE: **Modeling a Lab Demonstration** and Lab Selections

I. Conduct a simple lab experiment while demonstrating the safety and instructional expectations for students. Assess their understanding with prompts throughout the demonstration.

II. Determine lab teams and lab selections (lab selections can be found in the Properties of Matter folder).

DAY TWO: **Planning Your Lab**

I. REVIEW: Begin this class session with a review of the properties of matter using the Science Textbook, Chapters 5, 6, and 7. Quiz or prompt students to determine their level of understanding of chemical bonds, chemical reactions, physical and chemical properties of matter, and energy exchange. Introduce students to the Properties of Matter Lab Demonstration activity by providing a preview of the lab choices available.

II. Assign or allow students to select a lab partner. Each team should select one experiment and begin organizing their lab demonstration using the "PHASE I: Planning Your Lab" worksheet. Encourage low and high-level students to select experiments appropriate to their abilities. (Some experiments are more difficult and some are much easier than others.) Students should review the materials needed to complete their experiment with the teacher to be sure the materials are avai lable at school. (OPTION: Students may be responsible for acquiring the materials needed for their experiment. Most materials are comprised of basic household and kitchen items.)

DAY THREE: **Experimentation**

I. REVIEW: Remind students that 2 heads are better than 1 and partners should keep each other on task and making sure proper procedures are followed throughout the experiment (including safety precautions). PHASE I (completed DAY 1) should have included a prediction in the hypothesis. These may be reviewed prior to the start of PHASE II - Experimentation.

II. **PRE-EXPERIMENT**: Instruct students to begin by carefully reading the directions found in PHASE II. Students who are following the directions should ask for their lab materials after they have checked off the first 2 items on their lab sheet. Once the materials have been secured and the procedures reviewed with the teacher, the PRE-EXPERIMENT Review should be initialized by the teacher.

III. **COMPLETE YOUR EXPERIMENT**: Monitor team progress as students complete their experiments. Prompt students to determine their observations and understanding of the concepts and properties of matter being observed during their experiment. Encourage students to take notes and complete their data or observation table as they complete the experiment. Students are responsible for maintaining a clean work environment before, during, and after the experiment. Students should return all materials and equipment clean and dry at the completion of their experiment.

IV. **POST-EXPERIMENT:** Prompt each team to insure that appropriate real-world examples are applied to the concepts and properties of matter explored in their lab. Encourage students to review the rubric for PHASE III: Demonstration while they are planning their class demonstration. If time allows, students may research their real-world application using the Internet or media center.

DAY FOUR**: Experimentation**

REVIEW: Determine which teams were able to complete their experiment during DAY 2 and which teams need to finish their experiment today. Encourage partners to remain focused and on task so that they are prepared for tomorrow's lab demonstration for the class. Review the Lab Demonstration Rubric.

DAY FIVE and SIX: **Demonstration**

I. REVIEW: Review the Lab Demonstration Rubric with the class and distribute the "STUDY GUIDE FOR PROPERTIES OF MATTER: PART II" worksheet. Instruct students to complete the study guide during each team's demonstration. Students should also be encouraged to ask questions at the end of each demonstration if sections on their study guide were omitted or unclear. Provide an example to assist students in completing the study guide.

II. EXAMPLE: Magnet attracting paper clips - Physical Changes Observed: paper clips stuck to the magnet Chemical Changes Observed: no chemical change occurred Properties of Matter Explored: magnetism and metallic bonds Real-world application: magnets can be used to hold metals in place: the free-flowing properties of metals allow many metals to become magnetized.

III. Chemistry Reaction Demonstration Labs – monitor student progress during labs for safety and for completion of the Lab Demonstration Rubric. Review the properties and changes after each lab demonstration to insure accuracy.

PROCEDURES for ASSESSMENT – The following may be used to assess this portion of the unit:
1. Demonstration Lab Report
2. Demonstration Lab Rubric
3. Participation during Lab Planning, Experiment, and Demonstration

APPROPRIATE LAB INVESTIGATIONS (to supplement or follow-up content)

DEMONSTRATION LABS:

STUDENT LABS: (Chemistry Reaction Demonstration Lab Report)

World's Simplest Electromagnet
Mill's Insulation Investigation
Spaghetti Strength
Disappearing Statues
Properties of Ionic and Covalent Compounds
Copper Caper
pH
Antacid Tablet Races
Popcorn Hop
Vitamin C Test
Ionic of Covalent Bonds
Activity Discovery
Chemical Reactions
Oil Spill; volume
Determining Reaction Rate

CHEMISTRY REACTION DEMONSTRATION LAB

PHASE I: PLANNING YOUR LAB

LAB TITLE: _____

LAB TEAM MEMBERS:

_____ _____

PROPERTIES OF MATTER EXPLORED IN YOUR LAB:

_____ _____

_____ _____

LAB HYPOTHESIS:

_____

_____

MATERIALS REQUIRED (including amount):

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

PROCEDURES (summarize using steps)

STEP 1: _____

STEP 2: _____

STEP 3: _____

STEP 4: _____

STEP 5: _____

Miriam Sutton, M.A., NBCT – Owner/Director

STEP 6: _____

STEP 7: _____

STEP 8: _____

STEP 9: _____

STEP 10: _____

DATA TABLE: (Use a sheet of notebook paper to design and draw your data collection table.)

CHEMISTRY REACTION DEMONSTRATION LAB
PHASE II: EXPERIMENTATION

PRE-EXPERIMENT: Read and check off the following items before beginning your experiment:

- ☐ Review all of the information from your lab worksheets with your **Chemistry Reaction Demonstration Lab Report** to be sure your lab report is complete and accurate.
- ☐ Conduct a final review of your procedures with your team.
- ☐ Be sure to have all of your materials and equipment within your reach.
- ☐ Be sure you have all the necessary safety equipment for your experiment and are wearing the equipment properly.
- ☐ Ask Ms. Sutton to confirm your Pre-Experiment review by signing below:
  Ms. Sutton: _____

COMPLETE YOUR EXPERIMENT: Maintain a clean work area throughout your experiment and remain seated. Remember to record your observations and data on your data table.

POST-EXPERIMENT: When you have completed your experiment, record your conclusions and findings based on your observations and data collection. Review your lab report and continue to PHASE III. Use your textbook (Chapters 5, 6, and 7) or the computer to locate real-world applications for the properties of matter and science concepts explored in your lab.

CONCLUSIONS and FINDINGS (Summarize in paragraph form):

CHEMISTRY REACTION DEMONSTRATION LAB

PHASE III: DEMONSTRATION

Work with your team to design your lab demonstration for the class. Consider the following when designing your demonstration:

- ☐ Visibility for the audience during your demonstration
- ☐ Clear and accurate chemical information for the audience (written and verbal)
- ☐ Clear, accurate, and visible data tables and/or graphs
- ☐ Clear and accurate findings
- ☐ Real-world applications from your lab