UNIT 2: STATES OF MATTER

Instructor: Frederic Williams
Subjects/Grades: Chemistry & Physics/ 11th & 12th grade
Number of Days: 4 classes 2 Labs 1 evaluation/assessment
NJCCCS Codes: 5.1A:1-8: 5.1B:1-7; 5.1C:1-3; 5.6A:2-11

Unit Objectives:

1. Students will be able to demonstrate an understanding of the properties and states of matter.

2. Students will be able to explain how matter undergoes changes in state by gaining or losing energy.

3. Student will discover and appreciate that RESEARCH is a human activity used by humans to explore and explain things.

4. In order to master all objectives Students will be able to:
   - **List** the 4 states of matter
   - **List** the physical properties of each state
   - **Explain** how matter changes states by the amount of energy it gains or loses

   - **Use** Powers Of Observation
   - **Ask** appropriate and relevant questions**!!!**
   - **Infer** or make reasonable guesses
   - **Use, Design,**or **Invent Tools** that will aid them in their research activity
   - **Design** Experiments
   - **RECORD EVERYTHING!!**
   - **Gather & Organize Data**
   - **Analyze Data**
   - **Draw Conclusions**
   - **Communicate** with other researchers both locally and through the Internet

Anticipatory Set for Unit:

1. Students will have initial experience with Laboratory Safety

2. Students will be able to use Lab equipment and materials to run an experiment

3. Students will have some experience in designing an experiment to answer a specific question

Independent Study or Practice:

Students will read Chapters 1 & 2 and answer ALL Section Reviews (SR) in their journals.

Evaluation or Assessment for Unit:

In order to determine which objectives have been met and to what degree, Students will either write a short essay on what they have discovered or will take a paper & pencil test.

LESSON 2.1: SOLIDS

Objectives:

1. Students will be able to list the observable physical properties of a SOLID.
2. Students will be able to infer the internal structure of a solid based on their observations
3. Students will be able to explain how the internal structure changes when heated.

Materials:

- 5 solid cubic blocks of equal volume but different weight.
- 2-3 solids of irregular shape and different weight
- Graduated cylinder

Procedures:

- Ask students what makes a substance “solid”
- Collect and list all reasonable responses on board
- Ask students how they would measure the volume of the objects
- Ask students how they would measure the “weight” of the objects
- Would the solids have weight in space?
- Introduce concept of DENSITY
- Ask students to design an experiment to test their “opinion”

Homework: Read chapters 1 & 2 and answer ALL Section Review questions in their journals.

NJCCCS: 5.1A:1-8: 5.1B:1-7; 5.1C:1-3; 5.6A:2-11

LESSON 2.2: LIQUIDS

Objectives:

1. Students will be able to list the observable physical properties of a LIQUID
2. Students will be able to infer the internal structure of a liquid based on their observations.
3. Students will be able to explain how the internal structure of the liquid changes when heated.

Materials:

- Graduated cylinder
- Round bowl
- Paper or Styrofoam cup
- Water
- Olive Oil
- Hot Plate

Procedures:

- Ask students what makes a substance “fluid” (flow)
- Collect and list all reasonable responses on board
- Ask students how they would measure the volume of the liquid
- Ask students how they would measure the “weight” of the liquid
- Review concept of DENSITY experienced with solids
- Ask students to design an experiment to test their “opinion”

Homework: Read chapters 1 & 2 and answer ALL Section Review questions in their journals.

NJCCCS: 5.1A:1-8: 5.1B:1-7; 5.1C:1-3; 5.6A:2-11

LESSON 2.3: GASES

Objectives:

1. Students will be able to list the observable physical properties of a GAS
2. Students will be able to infer the internal structure of a gas based on their observations.
3. Students will be able to explain how the internal structure of the gas changes when heated.

Materials:

- Balloons
- Air
- Hot Plate

Procedures:

- Ask students what makes a substance “fluid” (flow)
- Ask students why a balloon expands when more gas is added
- Ask students what would happen if the balloon was very strong and could not expand
- Collect and list all reasonable responses on board
- Ask students how they would measure the volume of the gas
- Ask students how they would measure the “weight” of the gas
- Review concept of DENSITY experienced with solids & liquids
- Ask students to design an experiment to test their “opinion”

Homework: Read chapters 1 & 2 and answer ALL Section Review questions in their journals.

NJCCCS: 5.1A:1-8: 5.1B:1-7; 5.1C:1-3; 5.6A:2-11

LESSON 2.4: HOT PLASMAS

Objectives:

1. Students will be able to list the observable physical properties of a HOT PLASMA
2. Students will be able to infer the internal structure of a plasma based on their observations.

Materials: (None)

Procedures:

- Ask students what they think might happen if you continue to add energy to a gas?
- makes a substance "fluid" (flow)
- Show film "Plasmas – The 4th State of Matter"

Homework: Read chapters 1 & 2 and answer ALL Section Review questions in their journals.

NJCCCS: 5.1A:1-8: 5.1B:1-7; 5.1C:1-3; 5.6A:2-11

LESSON 2.5: COLD PLASMAS

Objectives:

3. Students will be able to list the observable physical properties of a COLD PLASMA
4. Students will be able to infer the internal structure of a plasma based on their observations.