

# 4<sup>th</sup> Grade Chemistry Unit

Vocabulary: chemistry, atom, matter, particles, protons, electrons, neutrons, charge, neutral, attract, repel, matter, mass, volume, density, vacuum, elements, compounds, solution, solute, solvent, concentration, saturation

Thinking Frame Work Key: K=Knowledge, P=Patterns, M=Modeling, C=Creativity

## I. Colorado State Standards

Standard 1: Scientific Investigation

Students understand the processes of scientific investigation and design as well as conduct, communicate about, and evaluate such investigations.

### 1.1 Scientific investigations

**Understand and practice the process of scientific investigation.**

With teacher facilitation and in small groups the student will learn and follow the steps in the Scientific

Method:

- identify the problem.
- form a hypothesis (make a prediction).
- identify a procedure (list materials, steps, plan or strategy).
- test (experimentation).
- make observations (use tables, pictures and charts to explain in written form).
- collect data.
- interpret and draw conclusions.

Continue to develop appropriate questions and identify likely resources (For example: encyclopedia, atlases, nonfiction books and electronic media).

Standard 2: Physical Science

**Students know and understand common properties, forms, and changes in matter and energy.**

## 2.1 Characteristics of matter

**Know that matter has characteristic properties, which related to its composition and structure.**

Examine, describe, classify and compare tangible objects in terms of common physical properties (For example: state of matter, size, shape, texture, flexibility and color).

Measure common physical properties (length, mass, volume and temperature).

## 2.3 Interactions of objects in a system

Understand that interactions can produce changes in a system, although the total quantities of matter and energy remain unchanged.

Observe and describe parts of a system (For example: a circuit must include; battery, wire, motor, light bulb).

Describe and observed change (For example: crystal growth, circuit, chromatography in terms of starting conditions, type of change, and ending conditions, using words, diagrams or graphs).

Standard 3: Life Science

**Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.**

## 3.2 Matter and energy of living systems

Know and understand interrelationships of matter and energy in living systems.

## 4.4 Solar system

Know the structure of the solar system, composition and interactions of objects in the universe and how space is explored.

Standard 5: Science, Technology and Human Activity

**Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.**

### 5.1 Science, technology and human activity

Understand the connections between science, technology, human activity and their impact on the world.

Identify careers that use science and technology.

Describe the effects of pollution of the environment and suggest activities designed to conserve natural resources.

Standard 6: Scientific Connections

**Students understand that science involves a particular way of knowing and understanding common connection among scientific disciplines.**

### 6.1 Scientific connections

Understand that science is a changing body knowledge driven by a process of observation and investigation.

Recognize that when a science experiment is repeated with the same conditions, the experiment generally works the same way.

Identify observable patterns and changes in their lives and predict future events based on the patterns.

Compare a model with what it represents

## **II. Core Knowledge Content Guidelines**

### **A. Atoms**

1. Students will be able to explain that all matter is made up of atoms
2. Students will be able to explain that scientists have developed models of atoms, which have changed over time, to help us imagine what we cannot see. (K,M)
3. Students will be able to label the parts of an atom including the nucleus, protons, neutrons, and electrons. (P)
4. Students will be able to identify the charges of protons, neutrons, and electrons. (K,P)
5. Students will be able to explain the fact that unlike charges attract and like charges repel. (K)

### **B. Properties of Matter**

1. Students will be able to define mass as the amount of matter in an object. (K)
2. Students will be able to define volume as the amount of space a object fills. (K)
3. Students will be able to define density as the amount of matter that is packed into the space an object fills. (K,P,M,C)
4. Students will be able to explain that a vacuum is the absence of matter. (K)

### **C. Elements**

1. Students will be able to define an element as the simplest form of matter. (K)
2. Students will be able to explain that an element is made up of only one kind of atom and that most things are made of a combination of atom. (K)
3. Students will be able to identify familiar elements such as gold, copper, aluminum, oxygen and iron. (P)

## **D. Solutions**

1. Students will be able to explain that a solution is formed when a substance is dissolved in another substance (K,P,M).
2. Students will be able to identify the solute and solvent in a given solution. (K,P,M)
3. Students will be able to explain that the dissolved substance is still present in the solution even though they cannot see it. (K,P)
4. Students will be able to define concentration as an increase in strength or density. (K,P,M)
5. Students will be able to define saturated as being the point in which a solution can no longer absorb or dissolve a solute. (K,P,M)

# **III. Habits of Mind**

## **A. VALUES AND ATTITUDES**

By the end of fifth grade, students should:

1. Keep records of their investigations and observations and not change the records later. Offer reasons for their findings and consider reasons suggested by others.

## **B. COMPUTATION AND ESTIMATION**

By the end of the fifth grade, students should be able to:

1. Add, subtract, multiply, and divide whole numbers mentally, on Paper, and with a calculator.
2. Use fractions and decimals, translating when necessary between
3. decimals and commonly encountered fractions-halves, thirds, fourths, fifths, tenths, and hundredths.
4. context by comparing them to typical values.
5. state purpose of each step in a calculation.
6. Read and follow step-by-step instructions in a calculator or computer manual when learning new procedures.

## **C. MANIPULATION AND OBSERVATION**

By the end of the fifth grade, students should be able to :

1. Measure and mix dry and liquid materials in prescribed amounts, exercising reasonable safety.

#### **D. COMMUNICATION SKILLS**

By the end of the fifth grade, students should be able to:

1. Make sketches to aid in explaining procedures or ideas.
2. Use numerical data in describing and comparing objects and events.

#### **E. CRITICAL-RESPONSE SKILLS**

By the end of fifth grade, students should:

1. Recognize when comparisons might not be fair because some conditions are not kept the same.
2. Seek better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others.

### **IV. Skills and Content:**

The skills and the content of this unit will be achieved through the following activities

#### **A. Lectures**

1. We will draw and discuss the structure of the atom
2. We will discuss all lab results

#### **B. Notes**

1. The students will take notes on matter and terms relating to chemistry

#### **C. Comparisons**

1. We will compare the properties of solids, liquids and gases
2. We will compare the density of various matter in our labs

#### **D. Reading tables and graphs**

1. Student will learn how to use the Periodic Table of Elements

#### **E. Labs**

1. We will have labs relating to:

- a. Mass measurement
- b. Density
- c. Solution

## **V. Character Education**

### **A. Responsibility**

1. for lab equipment
2. safety rules in lab

### **B. Perseverance**

1. used during labs when results are not matching

### **C. Respect**

1. use respect when members of the groups are expressing ideas

### **D. Citizenship**

1. take care of lab so that the group is allowed to return

### **E. Cooperation**

1. work with partners

### **F. Integrity**

1. keep hands off things that you really want to touch, but shouldn't

### **G. Self Control**

1. stay in control during labs and activities