



Chem Workshop 5-6 Syllabus

Course Goals

1 The Scientific Method

Students learn about the methods used by scientists to investigate chemistry concepts in the real world, including experimental design, controls and variables, inference and observation, and data recording.

2 Concepts of Chemistry

Students learn about the core concepts of chemical science, such as states of matter and phase changes, heat, energy, acids, bases, atoms, chemical reactions, and energy.

3 Laboratory Science

Students learn the procedures used to conduct laboratory experiments, especially including safety procedures. They also get to design and conduct their own experiments in the lab.

Course Topics

1 Matter

Students learn about matter and the different types of matter that are around us every day.

2 Phase Changes

Students learn about what natural processes allow for matter to change into a different type of matter and how we can synthetically produce different types of matter.

3 Atoms

Students learn about the composition of atoms and how they describe different elements in the periodic table.

4 Energy

Students learn about different types of energy, including potential, kinetic, and thermal energy. Students complete activities and design processes to visualize and understand each type of energy.

5 Chemical Reactions

Students observe and experiment with different chemical reactions. Students practice data recording, making scientific observations, and observe fascinating and unique reactions.

6 Density

Students learn the role of density and complete challenges that help to determine the relative densities of different liquids using the scientific method.

7 Acids and Bases

Students learn about the chemistry behind acids and bases and how they impact our environment, such as the impact of acid rain on ecosystems.

Course Schedule

Day 1

Introduction and Icebreaker

Students get a chance to learn each other's names and introduce themselves.

States of Matter Sorting

Students arrange a given set of cards into categories to identify liquids, solids, and gases as the three categories of matter.

Lesson on Matter

Students try to come up with their own definition of matter and learn relevant vocabulary.

States of Matter

Students observe objects in each state of matter.

Speed of Water

Students explore the speed of water molecules in hot vs. cold water.

Matter Bingo

Students test their knowledge on the terms and concepts relating to matter with a competitive game of bingo.

Bouncy Ball

Students observe how different states of matter can be used to create an object.

Day 2

Phase Changes

Students learn about the different ways that matter can change phases.

Phase Change Activity

Students demonstrate their knowledge of phase changes with a brief activity.

Oobleck

Students learn about non-Newtonian fluids, and how they cross into different phases.

Venn Diagram

Students recollect all the information they've learned about matter and different phases by illustrating the differences and similarities through a Venn Diagram.

Snow Globe

Students observe the changes in matter that occur when liquid glycerin alters the consistency of water.

Day 3

Parts of an Atom

Students use a model kit to learn and understand the different parts of an atom.

Atomic Structure Timeline

Students learn about the history of atoms and the different models proposed by different scientists.

Chemdoku

Students play a game of Sudoku with chemistry rules.

Periodic Play

Students demonstrate their knowledge of atoms and the periodic table by creating a play performance for their classmates.

Day 4

Element Word Find

Students familiarize themselves with the different elements of the periodic table by playing a popular game.

Labeling the Periodic Table

Students learn about the different groups on the periodic table.

Periodic Table Battleship

Students practice using the information from the periodic table by playing a popular game.

Atomic Musical Chairs

Students visualize the role of electrons and orbitals in an atom through playing musical chairs.

Build the Periodic Table

Students explore an element of their choice by researching and building a model of the element.

Day 5

Spool Racer

Students learn about the concept of potential vs. kinetic energy through this activity.

Marble Roller Coasters

Students use their knowledge of energy to create a roller coaster for a marble.

Potential Kinetic Track

Students visualize the effects of potential and kinetic energy through this demonstration.

Homemade Thermometer

Students observe thermal energy by creating their own thermometers.

Rube Goldberg

Students practice using different types of energy to generate a circuit of simple machines that accomplish a certain task.

Day 6

Types of Reactions

Students learn the various types of chemical reactions that can occur.

Chemical Reactions Activity

Students demonstrate their knowledge of chemical reactions through an activity.

Baking Soda and Vinegar

Students observe a fundamental chemical reaction between baking soda and vinegar.

Pop Rockets

Students use chemical reactions to launch their own rockets.

Coke and Mentos

Students practice using the scientific method to observe the effects of different variables on this chemical reaction.

Day 7

Equilibrium

Students learn about the equilibrium of chemical equations.

Equilibrium with Paper Balls

Students use a demonstration to observe the concept behind chemical equilibrium.

How many Waldo's?

Students play a game of Where's Waldo to demonstrate the conservation of elements throughout a reaction.

Elephant Toothpaste

Students observe a fun chemical reaction that uses many different chemicals.

Identify the Chemical Reactions

Students play with different chemical reactions to identify the four main types of observable reactions.

Day 8

Density

Students learn the key concepts behind density.

Art using Density

Students use the relative densities of different liquids to create their own art.

Layering Liquids

Students engage in a competition to determine the relative densities of several household liquids.

Build a Boat

Students attempt to construct a boat that can float on water and hold as many marbles as possible without sinking.

SCUBA Diver

Students use materials to make a neutrally buoyant SCUBA diver figure.

Day 9

Acids and Bases

Students observe the differences between acids and bases by observing the different colors produced by each.

Testing pH

Students practice determining the pH of different household items.

Math of Acids and Bases

Students learn the math behind determining the pH and the pOH of different solutions.

Acid Rain

Students learn the implications of acid rain in the environment.

Day 10

Red Cabbage Test

Students determine the acidity/basicity of a common food.

The Scientific Method

Students use the scientific method to come up with their own research question.

Final Review

Students demonstrate the knowledge they learned in the course with a final review game.

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