

# Table of Contents

Dedication	3
Acknowledgments	4
Repro Rights	5
Who Are You? And ... How to Use This Book	10
Lab Safety	16
Recommended Materials Suppliers	19

## The National Content Standards (Grades 5-8)

1. *A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.*

2. *Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals is an example of such a group.*

3. *Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.*

## The 8 Big Ideas About Chemistry & Corresponding Labs

1. Each kind of matter has a unique set of properties that allows the chemist to identify that matter. These properties include solubility, density, magnetism, flame test color, and melting point, which are all independent of the size of the sample.

<i>Lab #1: Purple Streamers (solubility)</i>	22
<i>Lab #2: Double Occupancy (miscibility)</i>	24
<i>Lab #3: Frosty Coffee (melting point)</i>	26
<i>Lab #4: Mini Lava Lamp (density)</i>	28
<i>Lab #5: Demagnetizing Iron (magnetism)</i>	31
<i>Lab #6: Metal Flame Test (flame test)</i>	34

2. Matter can exist in three different states: solid, liquid, or gas. Matter changes state when the temperature goes up or down. If matter changes state directly from solid to gas or from gas to solid, it is said to be undergoing the process of sublimation. Carbon dioxide is an excellent example of a compound that sublimates at room temperature.

<i>Dry Ice Primer</i>	38
<i>Lab #7: Fog City</i>	40
<i>Lab #8: Dry Ice Cannon</i>	41
<i>Lab #9: Squealing George</i>	42
<i>Lab #10: The Invisible Fire Extinguisher</i>	44
<i>Lab #11: The Bubble Machine</i>	46

3. Some chemicals release heat when they react with other compounds. These reactions are called exothermic reactions. Other chemicals absorb heat when they react with certain chemicals. These reactions are called endothermic reactions.

<i>Lab #12: Ziplock Handwarmer</i>	50
<i>Lab #13: Surprise Fire</i>	52
<i>Lab #14: Poly A/B Heater</i>	54
<i>Lab #15: Instant Ice Pack</i>	56

4. Liquids that allow an electric current to pass through them are called conductors. Electricity can be used to separate compounds into elements, attach compounds to one another, and produce changes in pH. Metals can also be used to generate the flow of electricity in the presence of electrical conductors.

<i>Lab #16: Liquid Conductors</i>	59
<i>Lab #17: Exploding Water</i>	62
<i>Lab #18: Copper Coated Clips</i>	65
<i>Lab #19: Hand Battery</i>	68
<i>Lab #20: Lemons in Series</i>	71
<i>Lab #21: Electric Potato Pie</i>	74

# Even More Contents

5. Compounds and elements can combine or bond with one another in groups of two or more. When this happens, a new compound is formed that has its own, unique set of characteristics and can be identified by a change of state, change of color, odor produced, light produced, or heat gain or loss.

<i>Lab #22: Magnesium Floodlamps</i>	77
<i>Lab #23: Instant Sunshine</i>	78
<i>Lab #24: Coffee Capers</i>	80
<i>Lab #25: Acid Digestion</i>	82
<i>Lab #26: Rotten Egg Gas</i>	84
<i>Lab #27: Flame Jumper</i>	86
<i>Lab #28: Burning Steel</i>	88
<i>Lab #29: Orange Sorbet</i>	91
<i>Lab #30: Limewater Precipitation</i>	93

6. The number of free ions in a solution is measured on a scale from 1 to 14, called the pH scale. A solution that tests at 7 is considered neutral, a solution below 7 is acidic, and a solution above 7 is basic. Specially prepared papers have been created to identify acids, bases, and degrees of pH.

<i>Lab #31: The Litmus Test</i>	96
<i>Lab #32: pH Paper</i>	98
<i>Lab #33: Red Cabbage to Green</i>	100
<i>Lab #34: pH Pandemonium</i>	103
<i>Lab #35: Patriotic Electron Clouds</i>	106
<i>Lab #36: Disappearing Ink</i>	110
<i>Lab #37: Bloody Fingerprints</i>	114
<i>Lab #38: Rainbow Bouquet</i>	116
<i>Lab #39: Pink Kisses Never Lie</i>	119

7. Short, stumpy groups of molecules (called mers) can combine to form very long chains of molecules (called polymers). These molecules are characterized by their gooey, sticky ability to stretch and form long, elastic compounds that ooze and drip all over the place.

<i>Lab #40: Collapsible Coffee Cups</i>	122
<i>Lab #41: Thyxophyllic Goo</i>	124
<i>Lab #42: Pseudo Silly Putty</i>	126
<i>Lab #43: Slime</i>	128
<i>Lab #44: Monster Snot</i>	130
<i>Lab #45: Colloidal Mushrooms</i>	132

8. Some chemicals react with air and oxidize rapidly to produce large amounts of heat, light, and quite often, sound. We saved them for the end of the book because they are definitely the most fun but also require the most attention to safety.

<i>Lab #46: Smokescreen on Demand</i>	135
<i>Lab #47: Water Cannon</i>	138
<i>Lab #48: Baster Blaster</i>	140
<i>Lab #49: Lycopodium Flash</i>	142
<i>Lab #50: Cornstarch Fireballs</i>	144

<i>Science Fair Projects</i>	
<i>A Step-by-Step Guide: From Idea to Presentation</i>	148
<i>Step #1: The Hypothesis</i>	156
<i>Step #2: Gather Information</i>	165
<i>Step #3: Design Your Experiment</i>	170
<i>Step #4: Conduct the Experiment</i>	175
<i>Step #5: Collect and Display Data</i>	177
<i>Step #6: Present Your Ideas</i>	181

<i>Glossary</i>	185
<i>Index</i>	191