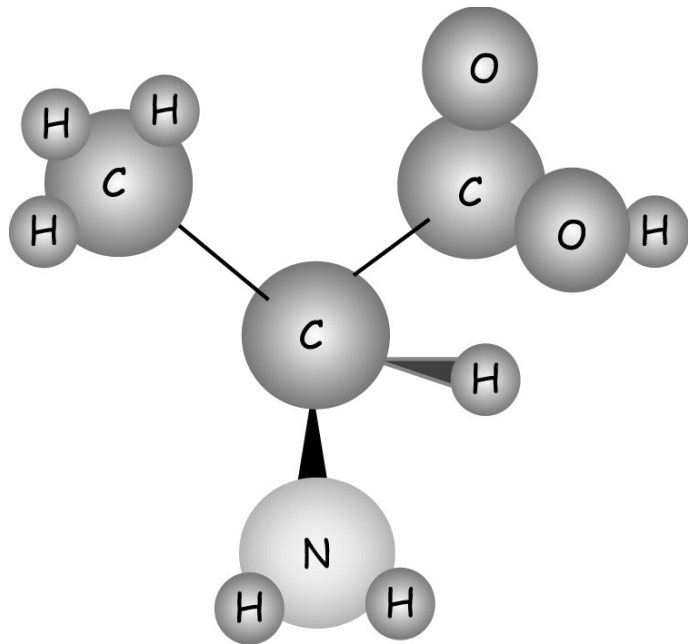


Real Science-4-Kids

# CHEMISTRY



## Level I Teacher's Manual

Dr. Rebecca W. Keller





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*To Kimberly, Christopher, Katy, Lorien, Sam, Ben and Lee*

## A note from the author

This curriculum is designed to give students both solid science information and hands-on experimentation. This level is geared towards second to fifth grades and much of the information in the text is very different from what is taught at this grade level in other textbooks. However, I feel that students beginning in the second grade can grasp most of the concepts presented here. This is a *real science* text and so scientific terms are used throughout. It is not important at this time for the students to master the terminology, but it is important that they be exposed to the real terms used to describe science.

Each chapter has two parts: a reading part and an experimental part. In the teacher's text, an estimate is given for the time needed to complete each chapter. It is not important that both the reading portion and the experimental portion be concluded in a single sitting. It may be better to split these into two separate days depending on the interest level of the child, and the energy level of the teacher. Also, questions not addressed in the teacher's manual may arise, and extra time may be required to investigate these questions before proceeding with the experimental section.

Each experiment is a *real science* experiment and not just a demonstration. These are designed to engage the students in an actual scientific investigation. The experiments are simple, but are written the way real scientists actually perform experiments in the laboratory. With this foundation, it is my hope that the students will eventually begin to think of their own experiments and test their own ideas scientifically.

Enjoy!

*Dr. Rebecca W. Keller*

## How to use this manual

This teacher's manual combines the student manual and laboratory manual in one book. The student pages are duplicated on the left hand side of this manual. On the right hand side additional information, not found in the student text, is given. This additional information is to be used as supplementary material in case questions arise while reading the text. It is not necessary for the students to learn this additional material as most of it is beyond the scope of this level. However, the teacher may find it useful for answering questions.

The laboratory section (or Experiments) together with the Review are found at the end of each chapter. The student pages are filled in with sample statements and answers. The right hand portion of each page contains additional information for each experiment not found in the student text.

All of the experiments have been tested, but it is not unusual for an experiment to fail. Usually repeating an experiment helps both student and teacher see where an error may have been made. However, not all repeated experiments work either. Do not worry if an experiment fails. Encourage the student to troubleshoot and investigate possible errors.

## Getting started

The easiest way to follow this curriculum is to have all of the materials needed for each lesson ready before you begin. A small shelf or cupboard or even a plastic bin can be dedicated to holding most of the necessary chemicals and equipment. Those items that need to be fresh are indicated at the beginning of each lesson. The following is a partial list of chemicals and equipment required for the experiments:

Periodic Table of Elements

Marking pens for writing on glass or wax paper

Several small jars (baby food jars)

Two large glass jars (pickle or mayonnaise jar)

White vinegar

Balsamic vinegar

Baking soda

Measuring spoons

Eye droppers

Elmer's® white glue

Elmer's® blue glue

Liquid laundry starch

Popsicle sticks

Distilled Water

Coffee filters

Ammonia

Rubbing Alcohol

Absorbent paper (white)

Iodine

Bleach

Sugar

Salt

Food coloring

Dish soap

Ball point ink pens of various colors

Timer

Wax paper

## Keeping a Laboratory Notebook

A laboratory notebook is essential for the experimental scientist. In this notebook, the results for all of the experiment are kept together with comments and any additional information. For this curriculum, you should record your experimental observations and conclusions directly on these pages, which is designated as the laboratory notebook-just like real scientists.

The experimental section for each chapter is pre-written. The exact format of a notebook may vary among scientists, but all experiments written in a laboratory notebook have certain essential parts. For each experiment, a descriptive but short *Title* is written at the top of the page together with the *Date* the experiment is performed. Below the title, an *Objective* and *Hypothesis* are written. The objective is a short statement that tells something about why the experiment is to be performed, and the hypothesis tells what is the predicted outcome. Next, a *Materials List* should be written. The materials should be gathered before the experiment is started. Following the materials list, the *Experiment* is written. The sequence of steps for the experiment is written beforehand and any changes are noted during the experiment. All of the details of the experiment are written in this section. All information that might be of some importance is included. For example, if you are to measure out 1 cup of water for an experiment, but you actually measured 1 and  $\frac{1}{4}$  cup, this should be recorded. It is hard sometimes to predict how small variations in an experiment will affect the outcome and it is easier to track a problem if all of the information is recorded.

The next section is the *Results* section. Here you will record your experimental observations. It is extremely important that you be honest about what is observed. For example if the experimental instructions say that a solution will turn yellow, but your solution turned blue - record blue. You may have done the experiment incorrectly or you might have discovered a new and interesting result, but either way it is

## Laboratory Safety

Most of these experiments use household items. However, some items such as iodine are extremely poisonous. Extra care should be taken while working with all chemicals in this series of experiments. Outlined below are some general laboratory precautions that should be applied to the home laboratory:

Never put things in your mouth except if the experiment tells you to. This means that food items should not be eaten unless it is part of the experiment.

If available use safety glasses while using glass objects or strong chemicals such as bleach

Wash hands after handling all chemicals.

Use adult supervision while working with iodine and any step requiring a stove.

# Contents

CHAPTER 1: MATTER	1	CHAPTER 4: ACIDS, BASES, AND pH	34
1.1 Introduction	2	4.1 Introduction	35
1.2 Atoms	2	4.2 The pH scale	35
1.3 Periodic Table	4	4.3 Properties of acids and bases	36
1.4 Summary	7	4.4 Measuring pH	37
Experiment 1: What is it made of?	8	4.5 Summary	38
Review of Terms	11	Experiment 4: Making an acid-base indicator	39
CHAPTER 2: MOLECULES	12	Review of Terms	42
2.1 From atoms to molecules	13	CHAPTER 5: ACID-BASE NEUTRALIZATION	43
2.2 Forming bonds	13	5.1 Introduction	44
2.3 Types of bonds	14	5.2 Concentration	45
2.4 Equally shared electron bonds	14	5.3 Titration	46
2.5 Unequally shared electron bonds	15	5.4 Plotting data	47
2.6 Bonding rules	15	5.5 Plot of an acid-base titration	48
2.7 Shapes of molecules	16	5.6 Summary	49
2.8 Summary	17	Experiment 5: Vinegar and ammonia in the balance; an introduction to titrations	50
Experiment 2: Making marshmallow molecules	18	Review of Terms	55
Review of Terms	23	CHAPTER 6: MIXTURES	56
CHAPTER 3: CHEMICAL REACTIONS	24	6.1 Introduction	57
3.1 Introduction	25	6.2 Types of mixtures	58
3.2 Combination Reaction	25	6.3 Like dissolves like	59
3.3 Decomposition Reaction	26	6.4 Soap	62
3.4 Displacement Reaction	26	6.5 Summary	63
3.5 Exchange Reaction	27	Experiment 6: Mix it up!	64
3.6 Spontaneous or not?	27	Review of Terms	68
3.7 Evidences for chemical reactions	28		
3.8 Summary	29		
Experiment 3: Identifying chemical reactions	30		
Review of Terms	33		

CHAPTER 7: SEPARATING MIXTURES	69	CHAPTER 10: BIOLOGICAL POLYMERS: DNA AND PROTEINS	99
7.1 Introduction	70	10.1 Introduction	100
7.2 Filtration	70	10.2 Proteins	100
7.3 Evaporation	70	10.3 Proteins are amino acid polymers	101
7.4 Solids, liquids, and gases	71	10.4 Proteins form special shapes	101
7.5 Chromatography	72	10.5 Protein machines	103
7.6 Summary	73	10.6 DNA	105
Experiment 7: Black is black?	74	10.7 DNA structure	106
Review of Terms	78	10.8 Protein machines on DNA	107
 		10.9 Summary	107
CHAPTER 8: ENERGY MOLECULES	79	Experiment 10: Amylase action	108
8.1 Introduction	80	Review of Terms	110
8.2 Nutrients	80		
8.3 Carbohydrates	81	Index-Glossary	
8.4 Starches	82		
8.5 Cellulose	83		
8.6 Summary	84		
Experiment 8: Show me the starch!	85		
Review of Terms	88		
CHAPTER 9: POLYMERS	89		
9.1 Introduction	90		
9.2 Polymer uses	90		
9.3 Structure of polymers	91		
9.4 Modifying polymers	92		
9.5 Summary	93		
Experiment 9: Goopy Glue	94		
Review of Terms	98		