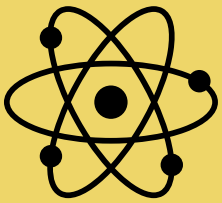
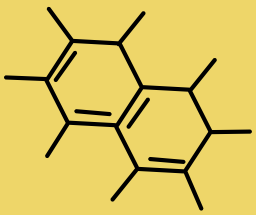
GREEN CHEMISTRY FOR ME

An Introduction To Green Chemistry For Young Students

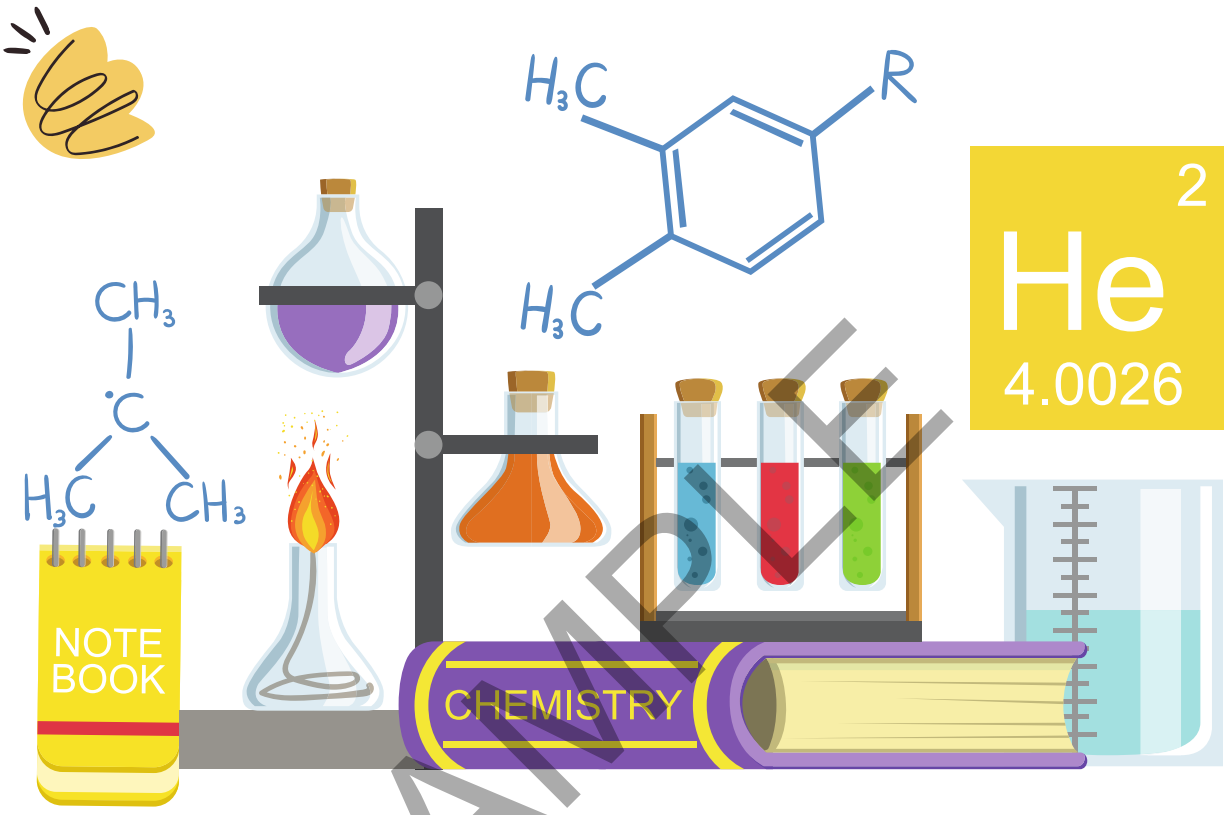
WRITTEN AND DESIGNED BY
CHLOE NG

CONTENTS





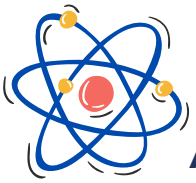
Chapter 1: Chemicals, chemicals everywhere!



Chemistry ... sounds like a challenging class that your older brother or sister takes in school, right?

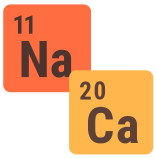
BUT do you know we are surrounded by chemicals and chemistry every day? Yes, I mean every moment of our life.

Hmm, you may ask what is chemistry and what is a chemical? Let's start from the beginning.



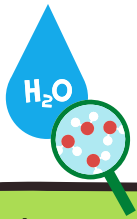
Atoms

All things in this universe are made up of very tiny particles called **atoms**.



Elements

Gazillions of the same atoms form an **element** such as iron, calcium, oxygen, and hydrogen.



Molecules

When two or more atoms combine together, a **molecule** is formed. Take the water molecule. It is constructed from 1 oxygen atom and 2 hydrogen atoms holding hands together (sort of).

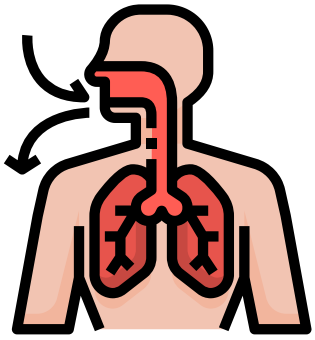
Chemicals

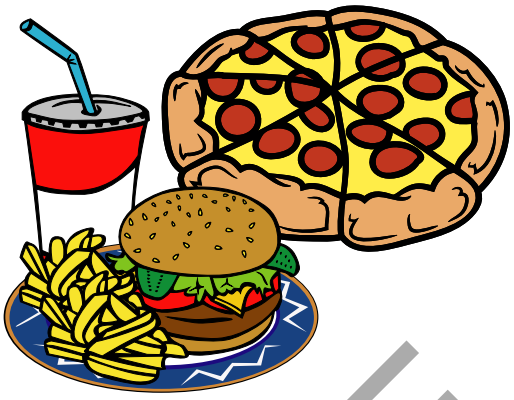
Molecules of the same or different kinds combine to form **chemicals** which always have the same combination of atoms.

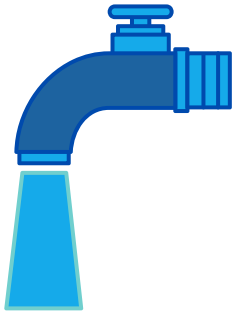
Chemical Products

Different types of chemicals are used to produce **chemical products** such as paint, batteries, cleaning products.

So, everything is made of chemicals - the air we breathe, the water we drink, the food we eat.

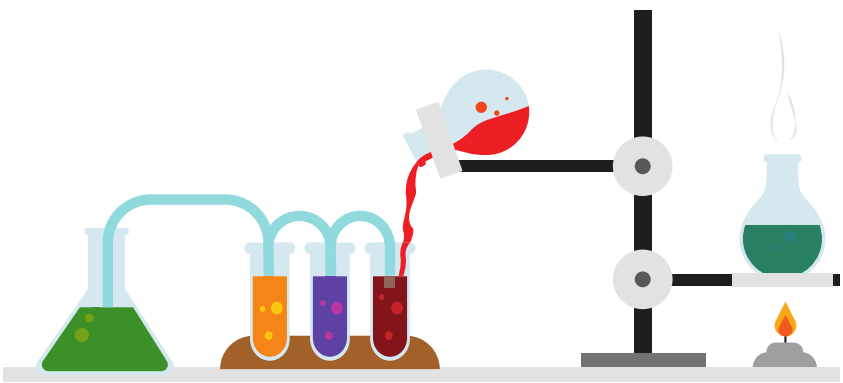




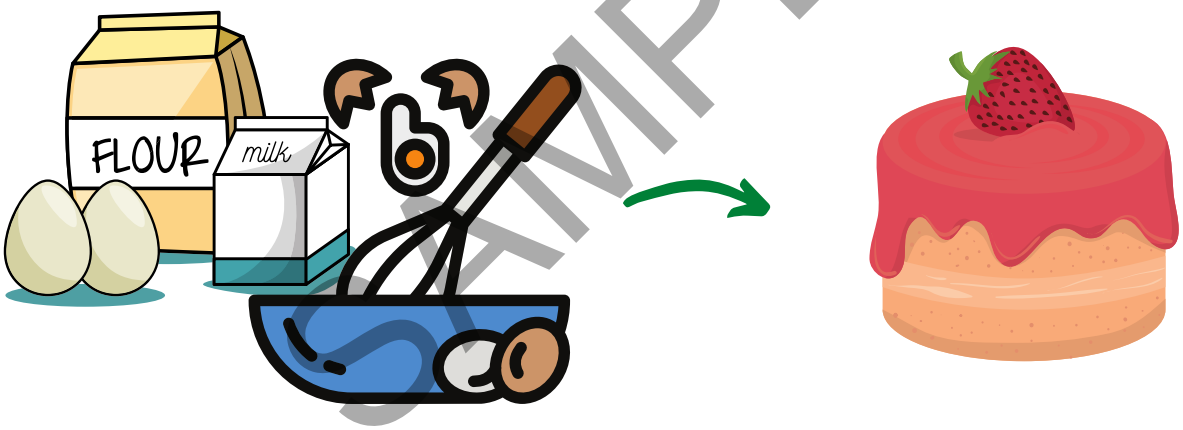


Even our own body is made of chemical elements such as oxygen, hydrogen, nitrogen, and carbon.

The study of chemicals and how they interact with one another and their environment is called **Chemistry**.



We can use chemistry to explain what's happening around us. Say you are baking a cake. You mix the ingredients (which are chemicals): flour, baking powder, eggs, sugar, salt, and oil in a pan and put the gooey mixture into a heated oven. The heat of the oven causes the eggs to change, which firms up the cake, while the baking powder produces gas bubbles that make the cake light and fluffy. A **chemical reaction** has just happened where the atoms in the ingredients rearrange to create a new substance - the cake - that looks and tastes completely different from the original ingredients.



Then when you eat a piece of that yummy cake you just baked, your stomach produces chemicals called digestive enzymes that break up the cake into smaller molecules that your body can use to give you the energy to run, play, and even the brainpower to do your homework! So eat more cake (just kidding!)

Green Chemistry can be an answer to many of the current environmental problems that we are facing now such as pollution to air, water, and land as well as human exposure to chemical toxicity. This book is a first introduction to young students who want to know and learn more about this promising field. It aims to emphasize the overarching principle of Green Chemistry which is waste prevention is way better than waste treatment and to simplify the technicality and complexities of the Green Chemistry process and principles.

About the author

Chloe Ng is a high school senior and her love for Chemistry was first sparked by her AP Chemistry teacher, Mr. B. Taylor who introduced her to the myriad world of Chemistry. Besides Chemistry, she is also interested in environmental studies and using Chemistry to solve environmental challenges. She has conducted research with UC Berkeley's College of Chemistry SYIP program and studied Microbiology and Environmental Toxicology with the COSMOS program at UC Santa Cruz. She hopes that this book can spark interests in Green Chemistry and environmental issues in young students.