Name: _____

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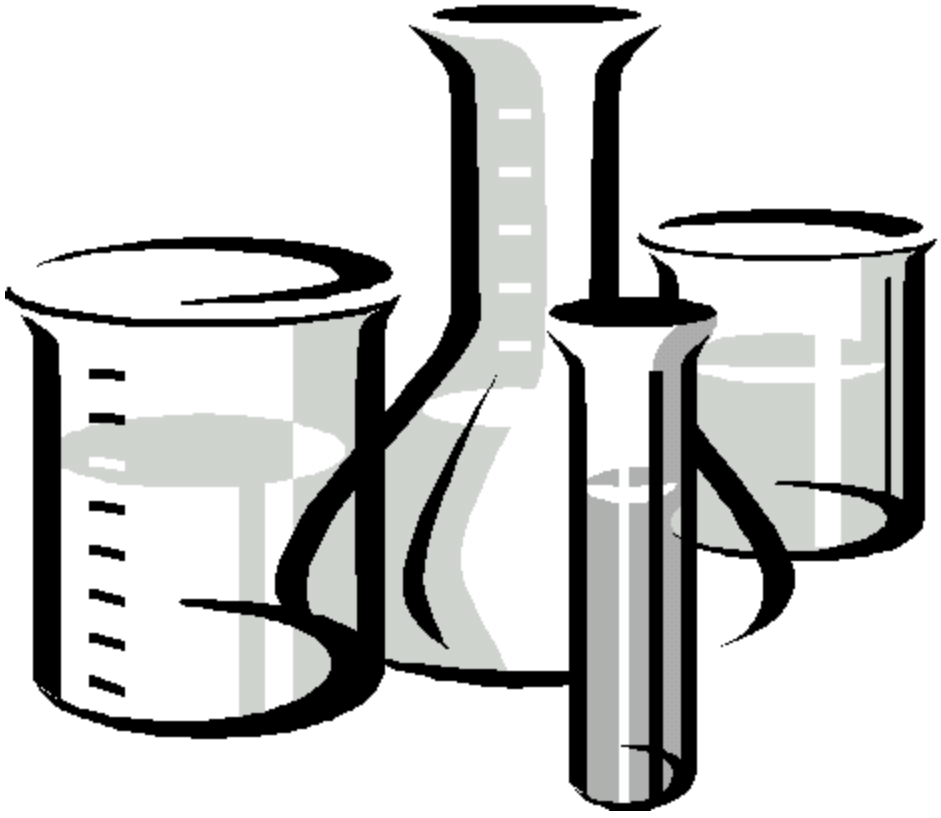
Chemistry Summer 2023 Packet



Section 1: What do you know?

Directions: Using only your background knowledge, answer all questions in complete sentences.

1) In your own words, what is the study of chemistry?

2) What careers use chemistry?

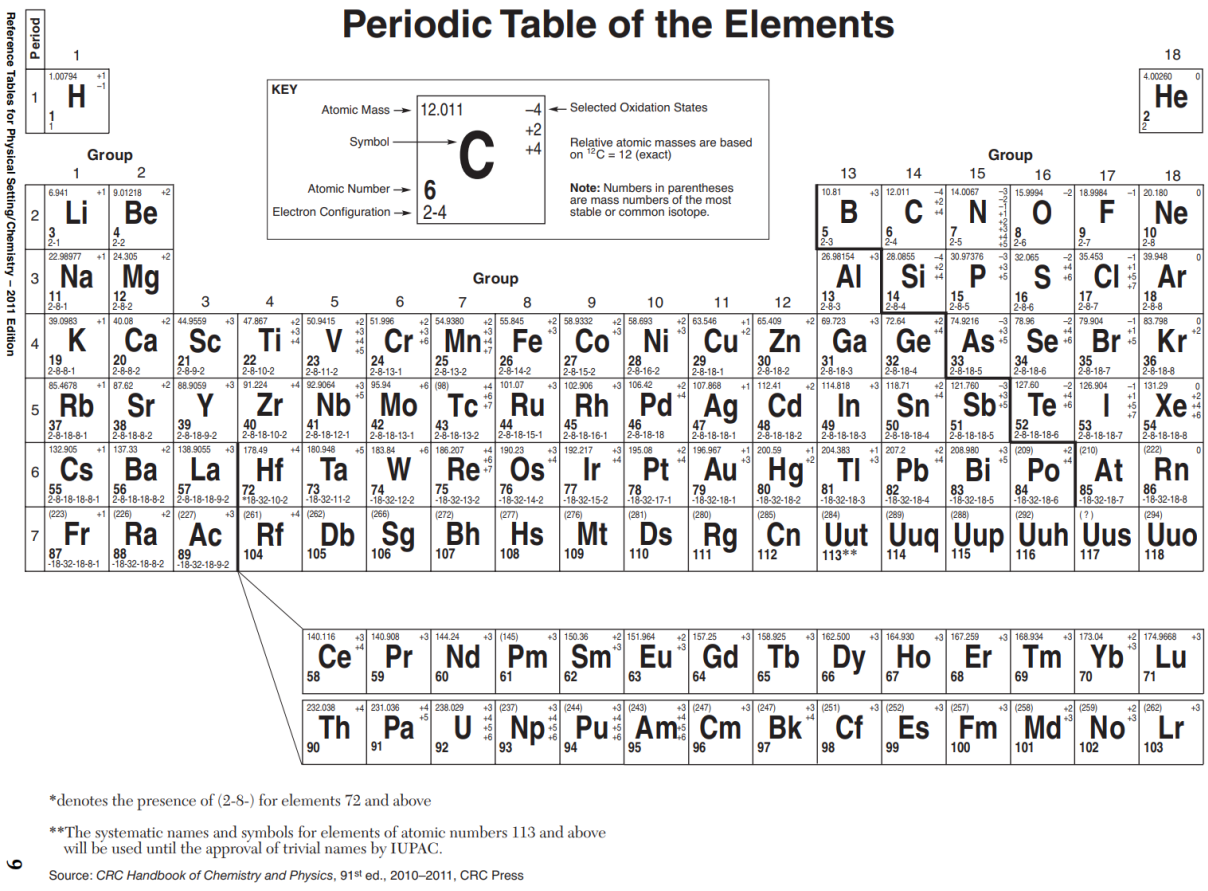
3) Name at least three things you expect to learn in chemistry.

4) Why do you think chemistry is important to learn?

5) List at least two things you want to learn in chemistry.

Section 2: The Periodic Table

Directions: Answer all questions in complete sentences and use the periodic table to aid you.



1) List the symbols of the first 18 elements.

2) List the names of the first 18 elements.

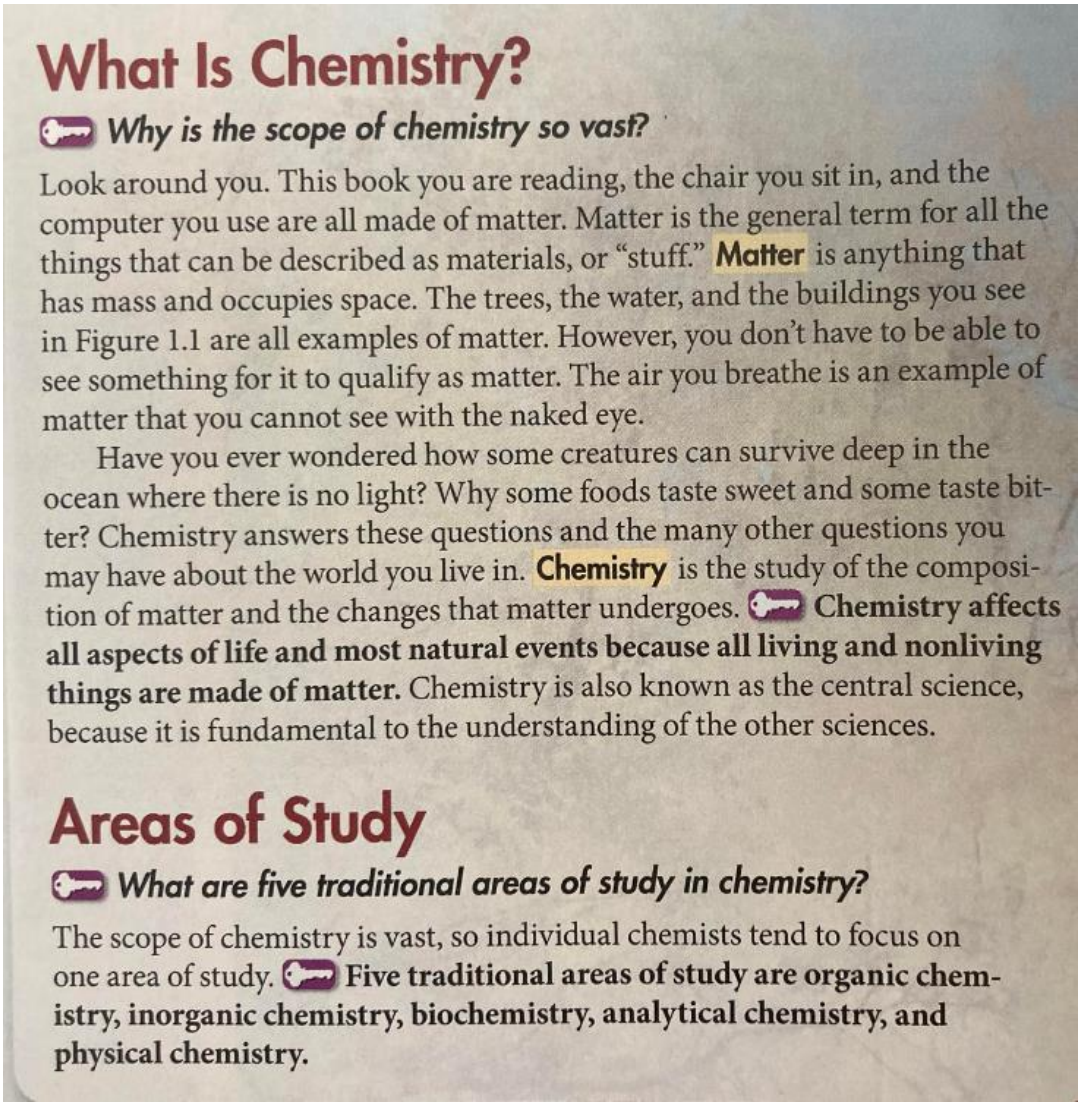
3) List the names of columns 1, 2. 13, 14, 15, 16, 17, & 18.

4) Identify five metals on the periodic table.

5) Identify the name and atomic number of the last element on the periodic table.

Section 3: What is Chemistry?

Directions: Read chapter 1.1 of "Pearson Chemistry" and answer the question below.
Citation: Wilbraham, A. C. (2010). *Pearson Chemistry*. Savvas Learning Company.



What Is Chemistry?

Why is the scope of chemistry so vast?

Look around you. This book you are reading, the chair you sit in, and the computer you use are all made of matter. Matter is the general term for all the things that can be described as materials, or "stuff." **Matter** is anything that has mass and occupies space. The trees, the water, and the buildings you see in Figure 1.1 are all examples of matter. However, you don't have to be able to see something for it to qualify as matter. The air you breathe is an example of matter that you cannot see with the naked eye.

Have you ever wondered how some creatures can survive deep in the ocean where there is no light? Why some foods taste sweet and some taste bitter? Chemistry answers these questions and the many other questions you may have about the world you live in. **Chemistry** is the study of the composition of matter and the changes that matter undergoes. **Chemistry affects all aspects of life and most natural events because all living and nonliving things are made of matter.** Chemistry is also known as the central science, because it is fundamental to the understanding of the other sciences.

Areas of Study

What are five traditional areas of study in chemistry?

The scope of chemistry is vast, so individual chemists tend to focus on one area of study. **Five traditional areas of study are organic chemistry, inorganic chemistry, biochemistry, analytical chemistry, and physical chemistry.**

Most chemicals found in organisms contain carbon. Therefore, organic chemistry was originally defined as the study of the carbon-based chemicals found in organisms. Today, with few exceptions, **organic chemistry** is defined as the study of all chemicals containing carbon. The study of chemicals that, in general, do not contain carbon is called **inorganic chemistry.** Many inorganic chemicals are found in non-living things, such as rocks. The study of processes that take place in living organisms is **biochemistry.** These processes include muscle contraction and digestion. The area of study that focuses on the composition of matter is **analytical chemistry.** A task that would fall into this area of chemistry is measuring the level of carbon dioxide in the atmosphere. **Physical chemistry** is the area that deals with the mechanism, rate, and energy transfer that occurs when matter undergoes a change.

The boundaries between the five areas are not firm. A chemist is likely to be working in more than one area of chemistry at any given time. For example, an organic chemist uses analytical chemistry to determine the composition of an organic chemical. Figure 1.1 shows examples of the types of research different chemists do.

Some chemists do research on fundamental aspects of chemistry. This type of research is sometimes called pure chemistry. **Pure chemistry** is the pursuit of chemical knowledge for its own sake. The chemist doesn't expect that there will be any immediate practical use for the knowledge. However, most chemists do research that is designed to answer a specific question. **Applied chemistry** is research that is directed toward a practical goal or application. In practice, pure chemistry and applied chemistry are often linked. Pure research can lead directly to an application, but an application can exist before research is done to explain how it works.

Big Ideas in Chemistry

What are the central themes of chemistry?

This book contains many ideas in the science of chemistry. One of the goals of your course in chemistry is to help you understand these ideas so you can use them to explain real situations that you may encounter in your life, such as the one shown in Figure 1.2. Fortunately, most of the topics of interest in chemistry are connected by a relatively few organizing principles, or "big ideas." **Some of chemistry's big ideas are as follows: chemistry as the central science, electrons and the structure of atoms, bonding and interactions, reactions, kinetic theory, the mole and quantifying matter, matter and energy, and carbon chemistry.**

BIG IDEA **Chemistry As the Central Science** Chemistry overlaps with all of the other sciences. Many physicists, biologists, astronomers, geologists, environmental scientists, and others use chemistry in their work.

BIG IDEA **Electrons and the Structure of Atoms** Carbon, oxygen, and copper are all examples of elements. Elements are composed of particles called atoms, and every atom contains a nucleus and one or more electrons. The type of products obtained in a chemical reaction is largely determined by the electrons in the reacting chemicals.

BIG IDEA **Bonding and Interactions** Most elements exist in chemical compounds, which are collections of two or more elements held together by relatively strong attractive forces. These forces, called chemical bonds, greatly influence the properties of compounds. Weak bonds between the particles of an element or compound can also contribute to the properties of the material.

BIG IDEA **Reactions** Chemical reactions involve processes in which reactants produce products. When you strike a match, the compounds in the head of the match combine with oxygen in the air to produce a flame. New compounds, along with light and heat, are formed. The compounds in the match head and oxygen are the reactants, and the new compounds are the products. Chemical reactions are important to the chemistry of living and nonliving things.

BIG IDEA **Kinetic Theory** The particles in matter are in constant motion. The ways in which these motions vary with changes in temperature and pressure determine whether a substance will be a solid, liquid, or gas.

BIG IDEA **The Mole and Quantifying Matter** In many aspects of chemistry, it is vital to know the amount of material with which you are dealing. In conducting a chemical reaction, you would want to use just the right amount of the reacting material so none is wasted. This measurement is possible using the mole, the chemist's invaluable unit for specifying the amount of material. Other concepts in chemistry also rely on the mole unit.

BIG IDEA **Matter and Energy** Every chemical process uses or produces energy, often in the form of heat. The heat changes that occur in chemical reactions are easy to measure. Changes in a quantity called free energy allow you to predict whether a reaction will actually occur under the given conditions.

BIG IDEA **Carbon Chemistry** There are about 10 million carbon-containing compounds, with new ones being prepared each day. Many of these compounds, including plastics and synthetic fibers, are produced from petroleum. Carbon compounds are the basis of life in all living organisms.

1) Explain: Why does chemistry affect all aspects of life and most natural events?

2) List: Name the five transitional areas into which chemistry can be divided?

3) Review: What are the “big ideas” of chemistry?

4) Describe: What is the relationship between pure and applied chemistry?

5) Infer: Why might a geologist ask an analytical chemist to help identify the minerals in a rock?

6) Why would a student who wants to be a doctor need to study chemistry.

7) List the eight big ideas of chemistry stated in the passage.

8) Apply Concepts: Workers diffing a tunnel through a city find some ancient pots decorated with geometric designs. Which of the following tasks might they ask a chemist to do? Explain why in complete sentences.
    a) Determine the materials used to make the pots.
    b) Explain what the designs on the pots represent.
    c) Recommend how to store the pots to prevent further damage.

9) The big ideas in chemistry can help you understand the world around you. For example, all matter is made up of atoms, which are held together in compounds by chemical bonds. The fire is a result of a chemical reaction between the carbon-containing compounds in the wood and the oxygen in the air. The fire gives off energy in the form of heat and light. The gas particles in the air around the fire begin to move faster as the air heats up.

Predict: Marshmallows are made up of mostly sugar, a carbon-containing compound. What do you think happens when the sugar is heated by fire?