Elements and Compounds

Step 1 Excite

Read aloud the story of creation found in Genesis Chapters 1 and 2. We can read that story without realizing that although God spoke things into existence and they happened, God is not a chaotic God. His creation was done in perfect order. He created everything within its proper structure. His physical world is not the only thing He created with order.

In our homes, the father should be the head of our family, then the mother, and then the children. There should be order in our homes, not to control or to bind, but for our protection and our well-being. The same is true in the world that God created. He created everything in a very specific, God-ordained way. And it could be said that the simplest part of his plan was this thing called elements.

When scientists break everything down to study it, elements come out shining as the simplest piece of each thing. Every single thing is made up of elements. Let's look then at God's handiwork as we study the foundation that He has put in place.

Step 2 Examine

Although scientists have “created” or discovered over 100 elements in their laboratories, there are ninety-two elements that are found in nature. As stated above, elements are the simplest piece of something—of everything—found on the earth. So just what is it that determines the characteristics and properties of each of these elements? It's the number of protons in their atoms’ nucleus that will decide what kinds of physical properties and chemical characteristics an element will display.

The smallest piece of an element is an atom, and when two atoms are placed together, they make up a molecule. Elements are organized for us on something called the “periodic table of elements.” Although there are different versions of the periodic table, the earliest and most recognized form is arranged like a big grid. The elements are organized very efficiently on the table according to specific characteristics of each one. Each is grouped together with similar elements (we’ll study the periodic table of elements in the next lesson).

When two or more groups of elements are bonded together, they form a compound. Compounds are formed by chemical forces. Because of this, physical forces cannot break down a compound. A compound can only be broken down chemically. You may be wondering what a chemical reaction is as well. When two chemicals do not react with each other when mixed, you simply have a mixture. But when chemicals react with each other, you have a
**chemical reaction.** Water is a compound. Most people know that water is made up of two atoms of the element hydrogen (H) plus one atom of the element oxygen (O), making one molecule of water (H₂O).

Another interesting thing about a compound is that when two elements are bonded together, the individual characteristics of each element are lost. For example, chlorine and sodium together make up table salt. But table salt as you know it is not at all like the individual qualities of either chlorine or sodium. Think about mixing colors. Yellow plus red equals orange. Red plus blue equals purple and so on. When you see red, there are individual things that may come to your mind. The word stop may be associated with red traffic lights and red stop signs. Red on a faucet warns of hot water. Blue on the other hand signals cold water. You might also think of the sky when you think of the color blue. But when mixed, they produce purple. Purple is not red and not blue. It is its own unique color with its own unique characteristics. What do you think of when you think of purple? Probably not hot, cold, sky, or stop. Why? Because purple stands alone as a color. The same is true with compounds.

Research elements. Use any resource (an encyclopedia, reference book, or the Internet). We recommend the following:

Books

- **The Usborne Internet-linked Science Encyclopedia**

- **How Science Works (Readers Digest)**

- **The New Way Things Work**
  Read: “Harnessing the Elements” (92-93).

- **Why Can't You Unscramble an Egg?**

- **The Usborne Book of Discovery**
  Read: “The Growth of Modern Chemistry” (78-79).

- **Exploring Creation with Physical Science**

- **A Guide to the Elements** by Albert Stwertka
  Description: The chemical elements and the basic principles of chemistry are the foundations of all scientific study, but this is the first book devoted to

Resources recommended in several lessons, other HOW Units. Key Resource (see beginning of unit).

Internet Sources

1. Interactive Physics Modules: Matter
   Description: An interactive, multimedia tutorial that teaches the basics of atomic structure and how atoms interact to create more complex compounds.
   http://ippex.pppl.gov/interactive/matter/

2. Carbon is 4 Ever
   Description: Carbon is 4 Ever is an interactive site that explores different aspects of organic chemistry. While giving a brief overview of the main areas of chemistry, the site focuses on the unique bonding capabilities of the carbon atom and a range of organic compounds (alcohols, alkanes, aldehydes, and carboxylic acids). The significance of “4” in the title is a reference to carbon’s valency number. To make the lesson interactive and fun, the popular theme of James Bond is used as a metaphor for the site in relation to carbon bonding. The learner must take on the persona of Bond: Carbon Bond. Students then must battle to save the world through five interactive missions and are motivated to learn and apply their knowledge by entertainment, success, and a scoring system. The final challenge tests information learned while going through the site.
   http://library.thinkquest.org/C005377/content/intro.htm

3. The Element Advertising Company
   Description: Students are assigned an element and must promote it in a contest-like environment.

4. Five Fantastic Elements
   Description: At this site you will find many interesting facts about chemistry, including information about five elements: Nitrogen, silicon, uranium, hydrogen, and oxygen. Includes links, quizzes, and resources.
   http://library.thinkquest.org/J002959F/

Underlined text refers to Internet link
An Internet Linked Unit Study

Adopt-An-Element
Description: Internet project from the Kid Zone. Worksheets provided.
http://www.sciencespot.net/Pages/classchem.html#Anchor4

Step 3 Expand

Choose and complete one of the following activities:

Activity 1: Narrate
Explain orally or in writing the process by which two or more elements combine to form a compound.

Activity 2: Paint a Picture
You will be researching compounds for this activity. Find out which compounds form things like salt and sugar. Using different color paints to represent each element, blend your “elements” to make up your compound. Think about the colors you are choosing for each element. Are you arbitrarily selecting colors or is there some color association behind your choice? Use your combining of colors for two purposes:
- a.) Discover the elements that make up at least five everyday items (e.g.: sodium + chlorine = salt).
- b.) Create your own painted version of the Creation story with your paint combinations.

Activity 3: Define Words
Add the following to your Vocabulary Notebook:
- chemical reaction
- compound
- element
- periodic table

Activity 4: Add to your Nature Notebook
Research some of the ninety-two naturally occurring elements. Find out where you would find ten of these, then write a short information page on each of the ten that you select. Include any unique or interesting facts about each one. Check punctuation, spelling, and grammar. Add your ten elements to your Nature Notebook.

Resources recommended in several lessons, other HOW Units. Key Resource (see beginning of unit).
Activity 5: Go on a Scavenger Hunt
Try to find as many examples of natural elements as you can. Can you find all ninety-two? Why or why not? Point scale: Five points for each example that is not in its natural form; fifteen points for each example that is in its natural form (example: Your mother's gold wedding ring is not in its natural form); fifteen points for a real untouched gold nugget. Add your findings to your Nature Notebook.

Step 4 Excel

We can see from this lesson that God has set in motion a plan for our universe. He has intricately woven things together with elements and compounds. He has created elements that will react just the right way with another element to form the things that we need. It is awe-some to think that He simply spoke the word, and these things came into being.

Do you remember the order of the family that we mentioned earlier? Let's form a compound of action and consequence. The Bible says that if we honor our parents we're promised long life. Read Exodus 20:12. How can you improve on this area of your life and ensure the blessing of long life for yourself? Discuss this with your parents.

Share what you have learned about elements with a younger person. Use an analogy to explain the difference between elements and compounds.

Correct all written work to demonstrate correct punctuation and spelling, and effective use of grammar. Add corrected written work or any illustrations to your Portfolio.

Underlined text refers to Internet link
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