

REVIEW OF ELEMENTS

In our everyday world, we see and use "elements" in many ways. Advertisements talk about, "Iron is needed for our blood" or "Silicon Valley." Unfortunately, not all references to elements are scientifically accurate. For instance, lead in a pencil is not the element lead, but the mineral graphite which is composed of the element carbon. A five cent nickel only has a small percentage of the metal nickel in it. The calcium in milk is not the element calcium, just a small percentage of calcium is contained in the chemical composition. Elemental calcium is a silver white metal and is very reactive.

The elements are grouped into units that have similar properties. For example elements 2,10,18,36,54, and 86 are classified as "rare or inert gases." Notice also that the colors on the periodic table refer to groups of elements that have similar characteristics. If an element is found naturally not in combination with other elements it is called a native element or native mineral.

COPPER - copper color, used to make pipes, teapots, etc (native mineral)

NICKEL - gray color, used to make nickels and metal, naturally magnetic

LEAD - gray color, used to make metals, flexible, heavy

SILICON - white or gray color, used in computer industry to make computer chips

CARBON - gray color, used in making pencils, rubs off easily

SULFUR - yellow color, used in making medicine, (native mineral)

ALUMINUM - gray color, used to make aluminum foil and other metals

IRON - gray color, used in the steel industry, and has other uses as a metal

ZINC - gray color, used as metal

TIN - gray color, shiny, bends, used as a metal

Element	Characteristics

ELEMENTS IN THE MARINE ENVIRONMENT

The oceans system is complicated. The water in the oceans is salty because as the surrounding rocks (land and under the oceans) erode, they release the minerals that make up the rocks. The minerals are dissolved in water and are in solution until either chemical or biological reactions in the oceans precipitate the minerals. For instance, radiolarians, a marine protozoa, can take Si + O dissolved in the marine water and create a siliceous skeleton of a water-based quartz (opaline $\text{SiO}_2 \cdot \text{H}_2\text{O}$).



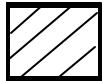
Erosion of the land also brings sediments to the oceans bottoms via rivers. The sediments drape the landscape of the ocean's bottoms, sometimes hiding the topography of the ocean's floors. The topography of the ocean floor is as varied as the continental topography.

Many elements are dissolved in seawater. "Elements in Seawater" illustrates which elements are dissolved in seawater. Some of these elements come out of solution in various forms which can be used for economic purposes. Manganese nodules which are potato-size masses found on the ocean floor are composed of manganese, cobalt, and nickel. Salt is also produced by solar evaporation of salt ponds, that precipitate sodium chloride.

PERIODIC TABLE ELEMENTS FOUND IN SEAWATER

H																	He	
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo					Ag	Cd	In	Sn	Sb			I	Xe
Cs	Ba			Hf	Ta	W					Au	Hg	Tl	Pb	Bi			Rn
Ra																		

La	Ce	Pr	Nd				Sm	Eu	Gd				Dy	Ho	Er	Tm	Yb	Lu
		Th	Pa	U														



Minor constituent (more than 1 gram per ton)



Major constituent (more than 20 grams per ton)



Essential for plant growth



Trace constituent (less than 1 gram per ton)



Dissolved gases, in part

1. Which form are elements found in marine water? (Clue: Molecule or ion.... what is the difference?)

2. List the elements that are a major constituent of seawater?

3. List the minor constituents of seawater?

4. List the dissolved gases in seawater? (There is an error on the graph? Clue: one of the major gases dissolved is not shown, can you guess which one it may be if it is needed for living organisms?)

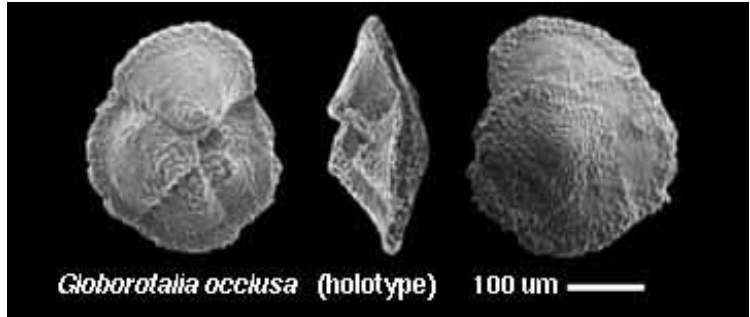
5. How does the marine water get so many elements dissolved in it?

6. What is the difference between fresh water and marine water?

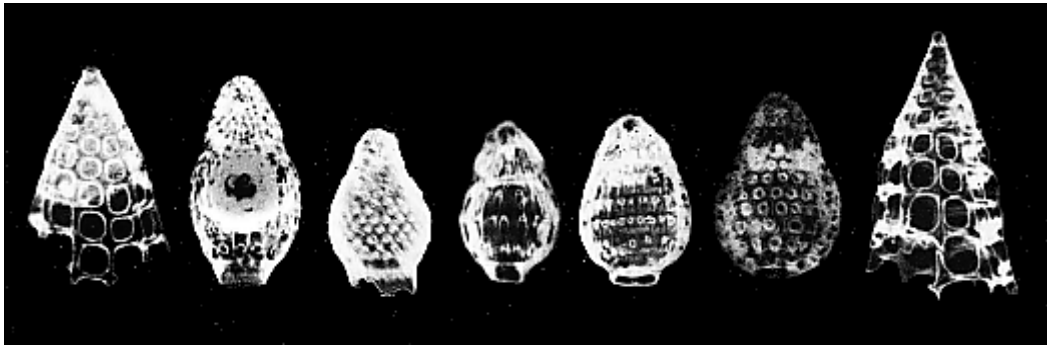
7. Which two elements, which by themselves are lethal to humans, are important to our very existence? (Clue: we use it on French fries.)

ORGANISMS IN MARINE ENVIRONMENT USE ELEMENTS

Organisms that live in the marine environment tend to use two types of compounds, CaCO_3 and SiO_2 . The biological life can actually transform the compounds, usually in another form to these common minerals. Calcium carbonate is a mineral called calcite. When incorporated into a biological system it is usually in a more "disordered" form called aragonite. The foraminifera below, use calcium carbonate in its shell.



Silica dioxide is also very common mineral, in the form of quartz. When used in the biological system it is also more "disordered" and is called opaline silica. Radiolarians use opaline silica for its skeleton.



Draw a picture of a foraminifera and radiolaria that you are looking at, under the microscope.

