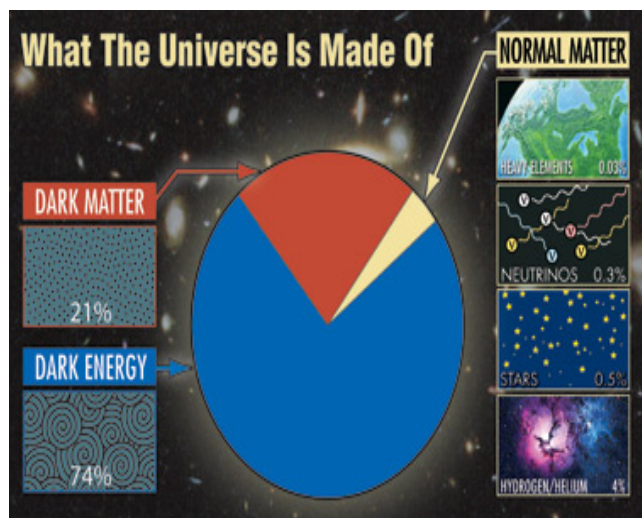
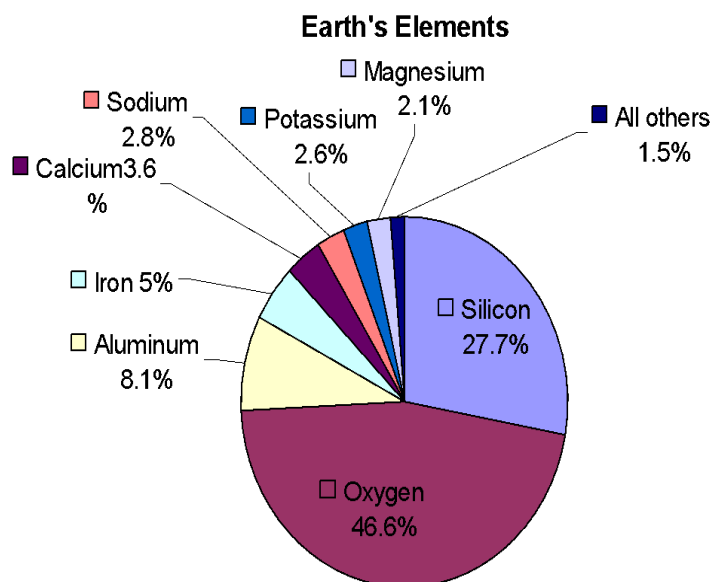


Abundances of Matter

Part 1: Earth's Matter Compared to the Universe

Using the circle graphs below, answer the following questions:

- A. What are the 2 most abundant elements in **Earth** and their percentages? 1. Oxygen = _____ 2. _____ = _____
- B. How much more Oxygen is there compared to Iron **on Earth**?
- C. Name 3 elements **in the Earth** that may be included in the "All Others" category: 1. _____
2. _____
3. _____
- D. Out of **Earth's** most abundant elements, what do they all have in common? (See *periodic table we colored located on my website*)



Use the graph "What the Universe is Made of" on the right to answer the following questions:

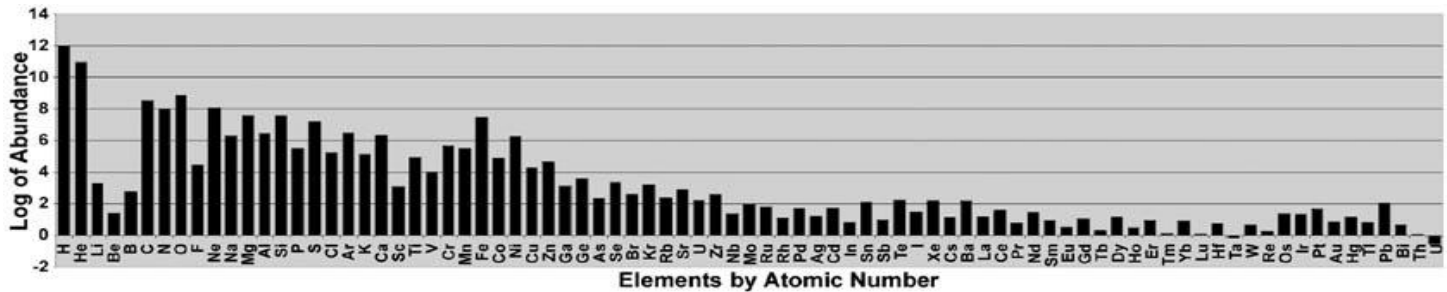
- E. How much matter in the universe is "Normal Matter"?
- F. What do you think "Normal Matter" is?
- G. If we cannot see Dark Matter or Energy, how do we know it exists?
- H. What are the two most abundant elements in the universe? 1. _____ = _____% 2. _____ = _____%
- I. What do these two elements have in common? (See *periodic table*)
- J. Why do you think that the most abundant elements are different on Earth compared to what is found in the universe?
- K. Where might the abundance of elements in our solar system be similar to the universe?

Part 2: Cosmic Abundances Activity

This activity provides practice for reading and interpreting the log plot of solar system elemental abundances.

1. Refer to the chart of the solar system abundances

(*HINT: C or Carbon = 10^9 or 10,000,000,000)



- A. From the plot, determine the abundances of the following elements:

Hydrogen _____ Helium _____ Aluminum _____ Gold _____

****HINT: There is 10^1 times more C than N)**

1. How much more hydrogen is there in the solar system than helium?
2. How much more hydrogen is there than aluminum?
3. How much more hydrogen is there than gold?

- B. Below is a table of the various processes in the universe that create elements. Also listed are the combined abundances (relative to hydrogen) of that particular groups of elements.

Process	Predominant elements	Combined Abundance
Big Bang	H, He	1.10×10^{12}
Small Stars	C,N,O	1.19×10^9
Large Stars	other elements with atomic numbers up through Fe	2.56×10^8
Supernovae elements	with atomic numbers above Fe	1.94×10^6
Cosmic Rays	Li, Be, B	2.68×10^3

1. Come up with one way to illustrate or plot these data. Think of different types of graphs than the one above. (HINT: Circle Graph, Line Graph, Etc)