Cosmic Chemistry: Understanding Elements

The Modern Periodic Table

STUDENT ACTIVITY: QUESTIONS AND STRATEGIES

READING THE MODERN PERIODIC TABLE

1. Describe how the groups and periods are different in the modern periodic table versus Mendeleev's version.
2. The modern periodic table is arranged by _____ _____.
3. Why was the oxide ratio column not shown in earlier Mendeleev periodic tables?

GROUPS

1. Why do elements in the same group have similar physical and chemical properties?
2. How are the groups titled?
3. How many groups are there?
4. List all of the elements in group 14 or IV A.

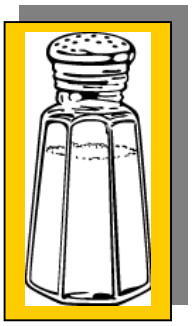
PERIODS AND CLASSIFICATIONS

1. Periods are arranged in _____ rows.
2. How many periods are there?
3. List all of the elements in period 2.
4. What are the three classifications of elements?
5. Metals are found on the _____ side of the table.
6. Name the element in period 4 group IA (1).
7. Write the atomic symbol for the element in period 6 group IB (11).

METALS

1. List some of the properties of metal.
2. Why do metals have a luster?
3. Where are the most metallic metals found on the periodic table?

THE ALKALI METAL GROUP



1. List the atomic symbols for the elements in this group.
2. Describe the relationship between the atomic number and the chemical reactivity of alkali metals.
3. When metals in this group react with nonmetals, ionic compounds are formed. The metal loses one electron and becomes a _____charged cation.
4. Describe the distribution of the metals in this group.

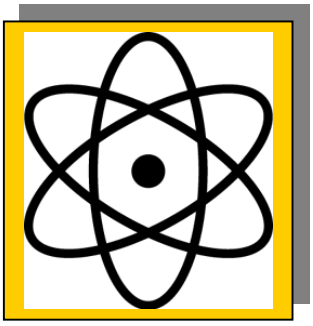
THE ALKALINE EARTH GROUP

1. Compare and contrast the bonding and reactive ability of the alkaline earth group to the alkali group.
2. Describe how calcium and magnesium ions affect water.
3. List the atomic symbols for the elements in this group. Circle those that are of interest to Genesis scientists.

THE TRANSITION METALS

1. Why is this group also known as the “heavy metal” group?
2. Describe what alloys are and how they are used.
3. Name the three coinage metals. These three metals are good _____ _____.
4. Name the two transition metals that are of most interest to the Genesis scientists.

RARE EARTH METALS

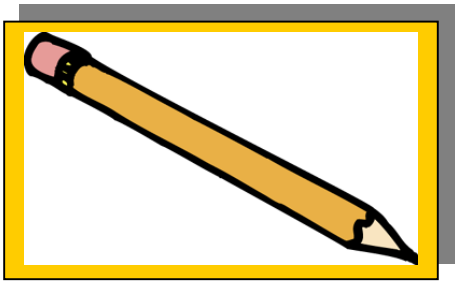


1. Name the two periods in this group.
2. Why do you think these elements are sometimes found under the rest of the table?
3. When radioisotopes decay they emit _____.
4. Describe the rate at which radioisotopes decay.
5. The most well-known naturally occurring actinide is _____, which can be used in _____.

OTHER METALS AND METALLOIDS

1. The staircase inside the periodic table separates the _____ from the _____.
2. List the atomic symbols for the metalloids.
3. What are semi-conductors and what are their uses?

NONMETALS

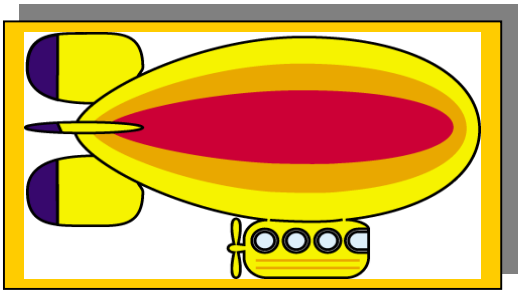


1. Which elements form compounds known as organic chemicals?
2. Most of our atmosphere is made up of _____ gas.

THE HALOGEN GROUP

1. Name the atomic symbols for the elements in the halogen group.
2. The word “halogen” means _____ _____.
3. Define “salt” in your own words.
4. Which element is the most reactive element on Earth?

THE NOBLE GAS GROUP (INERT GASES)



1. List the atomic numbers of the elements in group 0.
2. How was helium discovered?
3. Why do atoms of these elements not react with other atoms?
4. Which elements’ isotope ratios were measured by Apollo astronauts on the moon?

HYDROGEN

1. After reading the first paragraph in this section, where would you put hydrogen on the periodic table. Explain your answer.
2. Describe the basic components of the fusion reaction that occurs in our sun.

ELEMENTAL MYSTERIES FOR GENESIS SCIENTISTS

1. After reading the first paragraph in this section, write down several questions that Genesis scientists hope to answer.
2. Why do scientists want to know about the ratios of solar oxygen isotopes?
3. How might knowing the solar nitrogen isotope amounts bring about more questions?
4. How will the Genesis mission provide new data about the noble gases?
5. Why is it important that the solar wind samples be measured with ultra clean collector materials?