**Big Chem Problem Set**

# PERIODICITY

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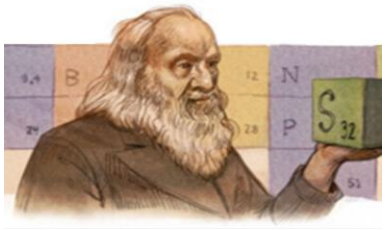


1. Who presented the first periodic table? How did he arrange it?
2. Identify each element as metal, nonmetal or metalloid: Cobalt, Zirconium, Germanium, Radon, Rhenium, Hassium, Boron, Niobium
3. The properties of four elements, V, W, X and Y are listed. Which is a metal, non-metal, metalloid and noble gas? V - a gas, does not react with any element, W - a solid, high density, good conductor of electricity, Y - brittle solid, metallic luster, conducts electricity some, X - brittle, high electronegativity, poor conductor of heat.
4. What are the general properties of metals, nonmetals and metalloids?
5. What type of elements (metal, nonmetal or metalloid) are oven mitts generally made of? Why?
6. What do all of the elements in the same period on the periodic table have in common?
7. How many groups on the periodic table are made up of all metals? Which ones?
8. How many groups on the periodic table are made up of all nonmetals? Which ones?
9. What is the octet rule? What does the octet rule have to do with the properties of elements?
10. Elements 17, 35 and 53 are all used to purify water. In relation to each other, where would you guess they lie on the periodic table? Why? What is this group of elements called?
11. What families make up the transition elements? What are characteristics of transition metals?
12. From their position in the periodic table, predict which will be more metallic: Be or B, As or Ge, Be or Ca, As or Bi.
13. What general electron arrangement is conducive to chemical inactivity? What are these elements called?
14. What family has one valence electron and is explosive in water?
15. What family has two valence electron and is used in fireworks?
16. Where on the Periodic Table, approximately, is the border between the metals and nonmetals (the metalloids)?
17. Which elements are called the 'rare earths'? Which part of the periodic table are all of the elements radioactive?
18. Describe periodicity. What does it have to do with the behavior of the elements?
19. As you go from left to right across a row of the Periodic Table, (a) What happens to the atomic number and the number of protons? (b) As a result, what happens to the pull on the electrons? (c) Therefore what happens to the atomic radius?
20. As you go from top to bottom down a column of the Periodic Table, (a) What happens to the number of shells? (b) As a result, what happens to the atomic radius?
21. Write the halogens in order of increasing atomic size of their atoms. Atomic radius data are in the reference table.
22. Describe the variation in atomic size: across a period and down a group. Explain this variation.
23. What is an ion? (a) What is a cation? (b) What is an anion? (c) Do metals or nonmetals form cations? (d) Do metals or nonmetals form anions? (e) Are cations bigger or smaller than their neutral atoms? (f) Are cations bigger or smaller than their neutral atoms?

**24.** What is first ionization energy? (a) Do metals have low or high first ionization energies? (b) Justify your answer to a using the octet rule. (c) Do nonmetals have low or high first ionization energies? (d) Justify your answer using the octet rule.

**25.** Describe how first ionization energy changes as (a) You move down a family. (b) You move up a family. (c) Explain this trend using valence electrons and shells. (d) You move from left to right across a row. (e) You move from right to left across a row. (f) Explain this trend using the octet rule.

**26.** What is electronegativity? Describe how electronegativity changes as (a) You move down a family. (b) You move up a family. (c) Explain this trend using the octet rule. (d) You move from left to right across a row. (e) You move from right to left across a row. (f) Explain this trend using valence electrons and shells.

**27.** List the 5 most electronegative elements on the periodic table from highest to lowest electronegativity.