

BIG CHEM: Unit 4 - Periodic Table

Problem Set #4

Due: Friday, November 9
Mr. Darlington

- Note: questions referring to 'what type of element' refer to 'type of element' as metal, nonmetal or metalloid.
- 1 Write a summary paragraph on the article: "Element 118, Heaviest Ever, Reported for 1,000th of a Second"
 - 2 Identify who presented the first periodic table and describe how this person decided how it should be arranged.
 - 3 How are elements on the periodic table arranged?
 - 4 Identify the following elements as metal, nonmetal or metalloid.
Cobalt, Zirconium, Germanium, Radon, Rhenium, Hassium, Noron, Niobium
 - 5 What do all of the elements in the same period on the periodic table have in common?
 - 6 An element is in a closed box. Guessing what type of element would give you the best chance of guessing what type of element it is?
 - 7 The properties of five elements, V, W, X and Y are listed below:
V - a gas, does not react chemically with any element.
W - a solid, high density, good conductor of electricity.
X - brittle solid, high electronegativity, poor conductor of heat and electricity.
Y - brittle solid, metallic luster, conducts electricity somewhat.
Which is a metal, non-metal, metalloid, and noble gas?
 - 8 What are the general properties of the three types of elements?
 - 9 What type of elements are oven mitts generally made of? Why?
 - 10 How many groups on the periodic table are made up of all metals? Which ones?
 - 11 How many groups on the periodic table are made up of all nonmetals? Which ones?
 - 12 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?
 - 13 What family's make up the transition elements on the periodic table?
 - 14 From their position in the periodic table, predict which will be more metallic:
 - a Be or B
 - b Be or Ca
 - c As or Ge
 - d As or Bi
 - 15 What general electron arrangement is conducive to chemical inactivity?
 - 16 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?
 - d Finally, what does this mean about the likelihood of losing electrons? Do the elements become more or less metallic?
 - 17 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?
 - c Therefore, what happens to the pull on the electrons?
 - d Finally, what does this mean about the likelihood of losing electrons? Do the elements become more or less metallic?
 - 18 Based on the analysis above, where do metals tend to be located on the Periodic Table? Explain.
 - 19 Based on the analysis above, where do nonmetals tend to be located on the Periodic Table? Explain.
 - 20 What do the elements at the extreme right of the Periodic Table have in common? What affect does this have on the chemical properties?
 - 21 Where on the Periodic Table, approximately, is the border between the metals and nonmetals (the metalloids)?
 - 22 Write the halogens in order of increasing atomic size of their atoms.
 - 23 How is helium similar to Argon and Neon? How is it different?
 - 24 How does the atomic radius for a nonmetal atom relate to its reactivity?
 - 25 Describe the variation in atomic size: across a period and down a group.
 - 26 Rank the following atoms by size, from largest to smallest: K, S, Al, P and Cl
 - 27 Oxygen and sulfur are very different - one is a colorless gas and the other is a yellow solid. Why then are they both in the same group?
 - 28 List the 5 most electronegative elements on the periodic table from highest to lowest electronegativity.
 - 29 List the 5 elements on the periodic table with the smallest ionic radius from smallest to largest ionic radius.
 - 30 Prepare a graph plotting the ionization energies of the period 4 and 5 elements as a function of their atomic numbers.
Use graph paper or Excel.
You will need to do some research to figure out what these numbers are.
Based on your graph from the previous question, how could you predict a reasonable value for the ionization energy of astatine?