

### Periodic Trends Worksheet

Part A- Answer in the space provided.

1. Why is the periodic table called the periodic table?  
- patterns appear at regular intervals (periodically)
2. How does atomic radius change within a period? Explain why this trend occurs?  
- atomic radius decreases as we move toward the right  
- more protons are added to nucleus, the nucleus has a larger "pull" on the  $e^-$ s and "pulls" them in.
3. How does atomic radius change within a family? Explain why this trend occurs?  
- atomic radius increases as we move down a family  
- at every period, an energy level is added to the atom increasing its radius.
4. How does ionization energy change within a period? Explain why this trend occurs?  
- ionization energy increases as we move toward the right.  
- the atoms are smaller, it is harder to remove an  $e^-$  more energy is needed to take an  $e^-$  away
5. How does ionization energy change within a family? Explain why this trend occurs?  
- ionization energy decreases as you move down a family  
- atoms get larger as you move down, less energy is needed to remove an  $e^-$
6. How does electronegativity change within a period? Explain why this trend occurs?  
- electronegativity increases as we move toward the right  
- atoms get smaller as we move right, there are more protons in the nucleus, the atom holds on to its  $e^-$  with a larger force
7. How does electronegativity change within a family? Explain why this trend occurs?  
- electronegativity increases as we move up a family  
- electrons are closer to nucleus (less energy levels) atoms hold on to  $e^-$  with more force
8. Why is K bigger than Ca?  
K has 1 less proton than Ca on its outer shell. It does not pull on its  $e^-$  as well.
9. Why is P smaller than Bi?  
Bi has 3 more energy levels than P which makes it bigger
10. Explain why francium is the most reactive metal.  
Francium is in Group 1 and wants to lose an  $e^-$  Because it's so big (7 energy levels), its valence  $e^-$  is very far away from the + charge nucleus + is not attracted to it, it's easily lost

←  
↓  
atomic radius

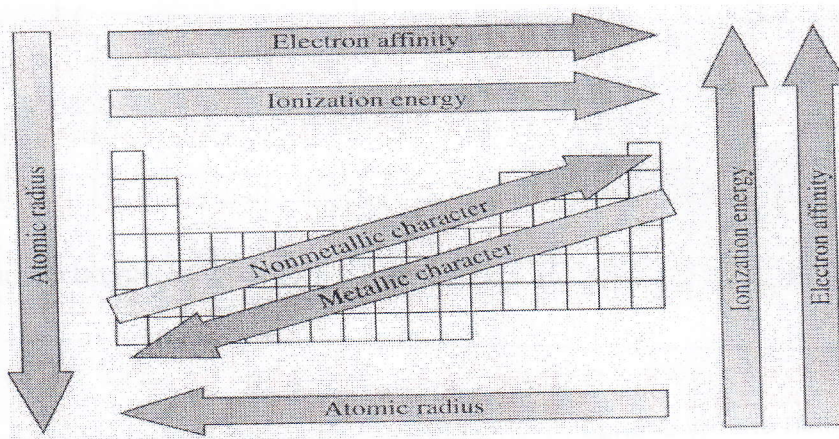
↑  
→  
ioniz. en.

↑  
→  
electroneg.

11. In each case below, circle the element that has the characteristic indicated.

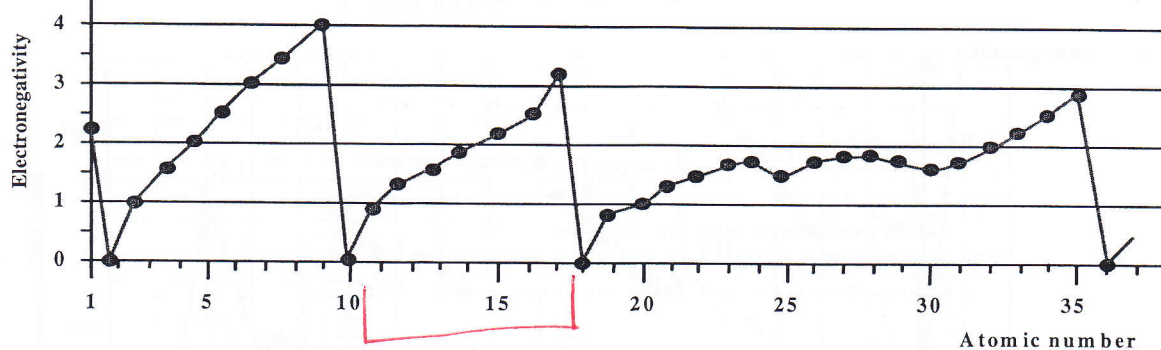
- |                               |                                     |    |                                     |
|-------------------------------|-------------------------------------|----|-------------------------------------|
| a) largest radius:            | <input checked="" type="radio"/> Li | or | <input type="radio"/> F             |
| b) smallest radius:           | <input checked="" type="radio"/> Be | or | <input type="radio"/> Ca            |
| c) highest ionization energy: | <input checked="" type="radio"/> Br | or | <input type="radio"/> K             |
| d) lowest ionization energy:  | <input checked="" type="radio"/> S  | or | <input type="radio"/> O             |
| e) highest electronegativity: | <input type="radio"/> Al            | or | <input checked="" type="radio"/> B  |
| f) lowest electronegativity:  | <input type="radio"/> F             | or | <input checked="" type="radio"/> C  |
| g) highest reactivity:        | <input type="radio"/> Na            | or | <input checked="" type="radio"/> K  |
| h) highest reactivity:        | <input type="radio"/> Br            | or | <input checked="" type="radio"/> Cl |

12. Using the table below, circle the correct statements.



- a. Magnesium has a larger atomic radius than sodium and beryllium. no yes
- b. Helium has the greatest ionization capacity and francium has the lowest ionization capacity.
- c. Sulfur has a much lower electronegativity than calcium.
- d. A non-metal atom is much larger than a metal atom.
- e. Silicon is a metalloid because it touches the staircase.
- f. Elements with three energy levels are bigger than elements with five energy levels
- g. Na holds on to its electrons more readily than K.
- h. It is harder to remove an electron from Mg than Cl.

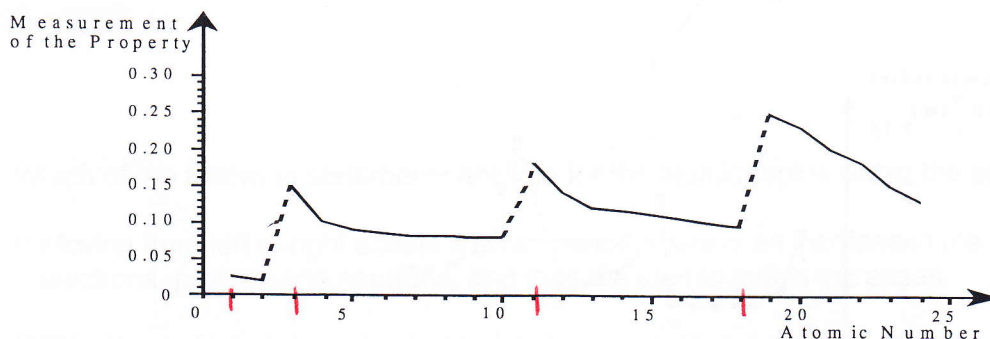
10. The graph below shows the electronegativity of some elements. Describe: the progression of this property for elements within the 3rd period on the periodic table.



- electronegativity increases across Period 3  
the atoms hold on to their electrons with more force.

Part B- Multiple Choice Select the best answer.

11. The following graph shows the measurement of a property of certain elements as a function of their atomic number.



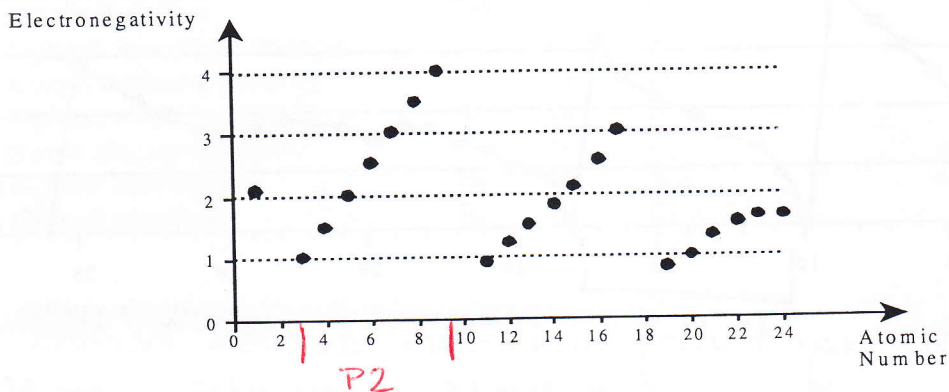
According to this graph, which of the following statements is TRUE?

- A) The measurement of this property is always greater at the end of a period than at the beginning of a period.
- B) The measurement of this property decreases and then increases across a period.
- C) The measurement of this property decreases from left to right across a period.
- D) The measurement of this property is greater for the last element of Period 2 than for the first element of Period 3.

12. What general observation can be made regarding the atomic radius across a row or a period of the Periodic Table?

- A) It increases with increasing atomic number.
- B) It decreases with increasing atomic number.
- C) It remains constant with increasing atomic number.
- D) It varies in an irregular fashion, with no relation to the atomic number.

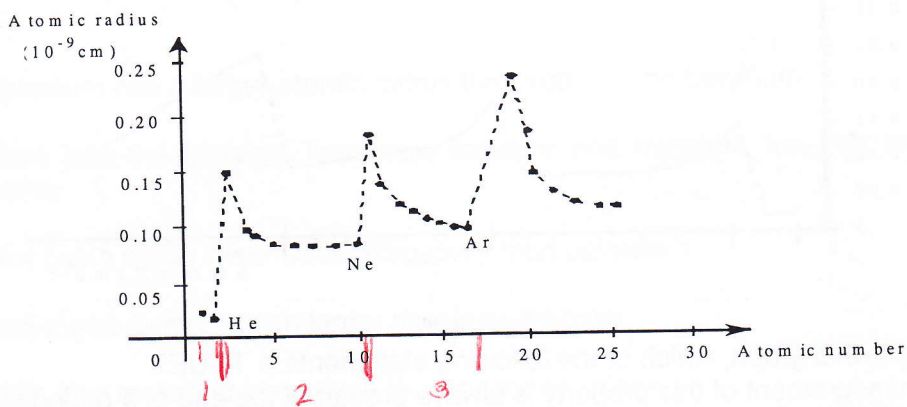
13. The following graph shows the change in the electronegativity of certain elements as a function of their atomic numbers.



According to this graph, which of the following statements is TRUE?

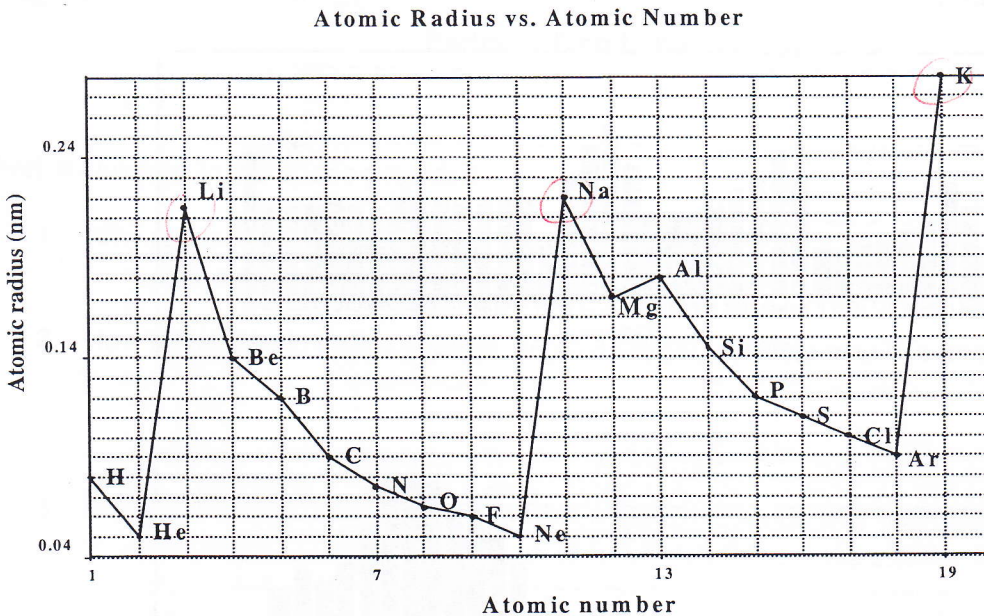
- A) In Period 2, electronegativity increases as the atomic number increases. ✓
- B) In Period 2, electronegativity decreases as the atomic number increases.
- C) In Period 2, electronegativity does not change as the atomic number increases.
- D) In Period 2, electronegativity decreases and then increases as the atomic number increases.

14. According to this graph, which statement best describes the change in the atomic radius as you move across a period?



- A) The size of the atomic radius increases as you move from left to right across a period.
- B) The size of the atomic radius decreases then increases across a period.
- C) The size of the atomic radius decreases as you move from left to right across a period. ✓
- D) The size of the atomic radius increases and then decreases across a period.

15. Consider the graph below.



Based on this graph, which of the following statements is correct?

- A) The atomic radius increases across the period and decreases down a group.
- B) The atomic radius decreases across the period and increases down a group.
- C) The atomic radius increases across the period and increases down a group.
- D) The atomic radius decreases across the period and decreases down a group.

16. Which of the following statements are true for the atomic radius within the same period?

I) Moving from left to right across a given period, there is an increase in the number of electrons, protons and neutrons, and thus the atomic radius increases.

II) The atomic radius decreases with the increasing atomic number across a given period. ✓

III) The atomic radius is independent from the type of atom within a given period. ✗

IV) Moving from left to right across a given period, there is an increase in the number of protons and electrons. Therefore the electric forces between nucleus and shell increases, thus reducing the atomic size. ✓

- A) I and III    B) I, II and IV    C) II and III     D) II and IV

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