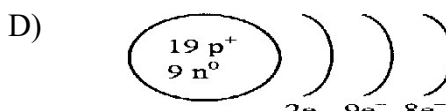
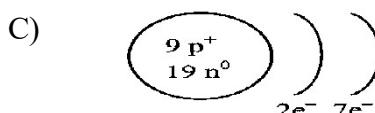
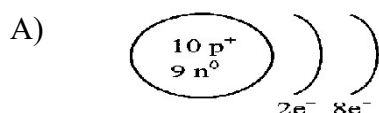


# Topic 1: Simplified Atomic Model and Periodic Table

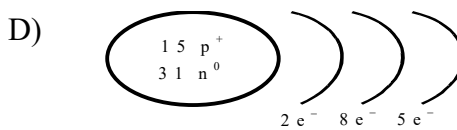
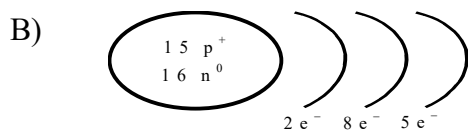
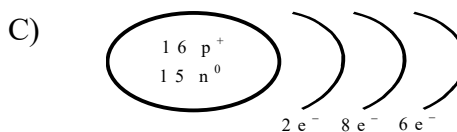
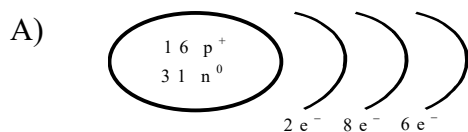
## Simplified atomic model

1. The atomic number of fluorine (F) is 9 and its mass number is 19. Which of the following diagrams correctly represents the simplified model of a fluorine atom?



Answer: B

2. Which of the following diagrams represents the simplified atomic model of the phosphorus atom,  $^{31}_{15}\text{P}$ ?



Answer: B

3. Which of the following characteristics describe an atom in terms of the simplified model?

1. The number of electrons is equal to the number of protons.
2. The number of protons is equal to the number of neutrons.
3. The nucleus is made up of neutrons, protons and electrons.
4. The nucleus is made up of neutrons and electrons.
5. The nucleus is made up of protons and neutrons.
6. Protons revolve around the nucleus.
7. Electrons revolve around the nucleus.

A) 1, 2 and 3

B) 1, 4 and 6

C) 1, 5 and 7

D) 2, 5 and 7

Answer: C

# Trends

## Multiple Choice

1. The properties of the elements in the periodic table vary from one element to another as you go down a group. Four of these variations are :

1. Atomic radius
2. Chemical activity
3. Electronegativity
4. Ionization

Which of these variations will increase as you go down group 1?

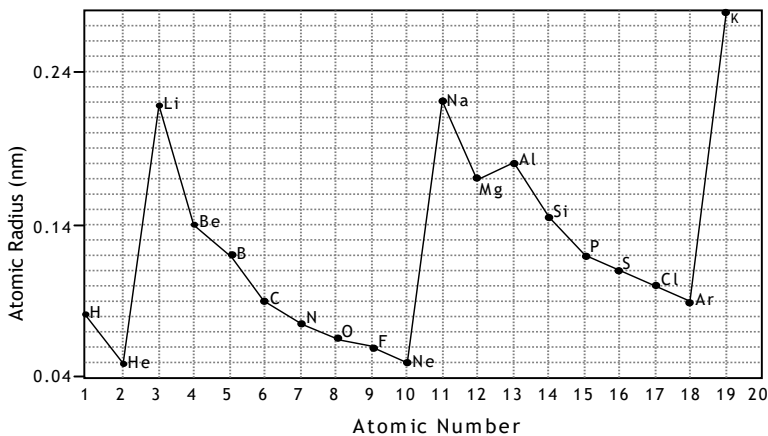
- A) 1 and 2      B) 1 and 3      C) 2 and 4      D) 3 and 4

Answer: A

2. The graphs below show the measurement of atomic radius and the measurement of electronegativity of certain elements as a function of their atomic number.

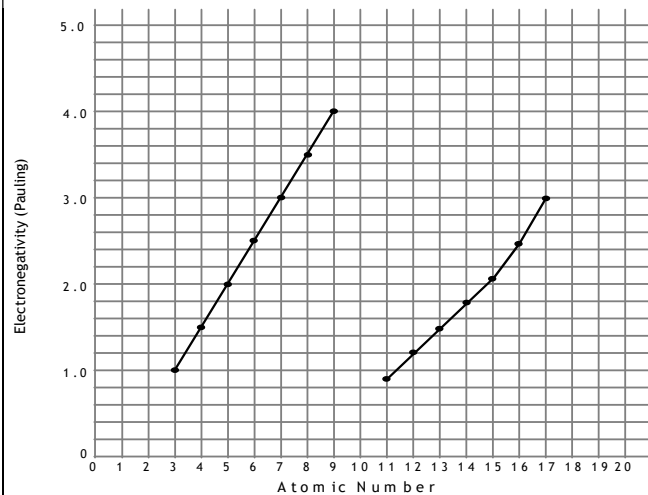
**Graph 1**

Atomic Radius versus Atomic Number



**Graph 2**

Electronegativity versus Atomic Number

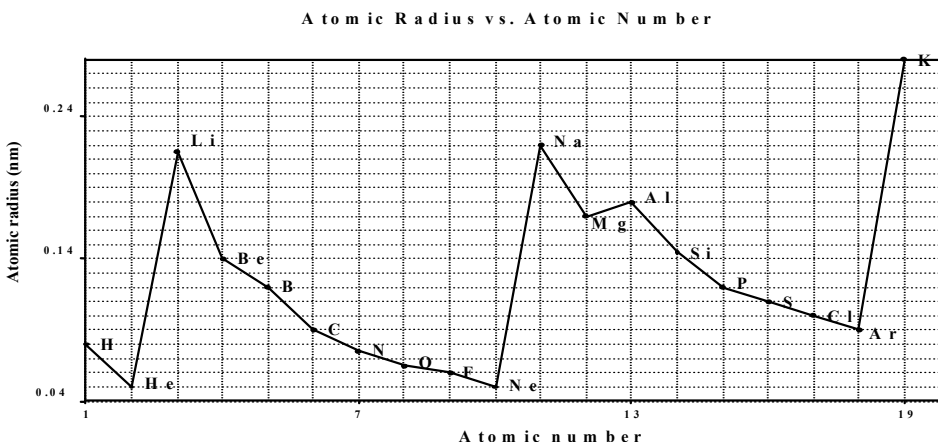


According to the graphs, which of the statements below is TRUE?

- A) Both atomic radius and electronegativity increase from left to right across a period.
- B) Both atomic radius and electronegativity decrease from left to right across a period.
- C) The atomic radius increases and electronegativity decreases from left to right across a period.
- D) The atomic radius decreases and electronegativity increases from left to right across a period.

Answer: D

3. 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.

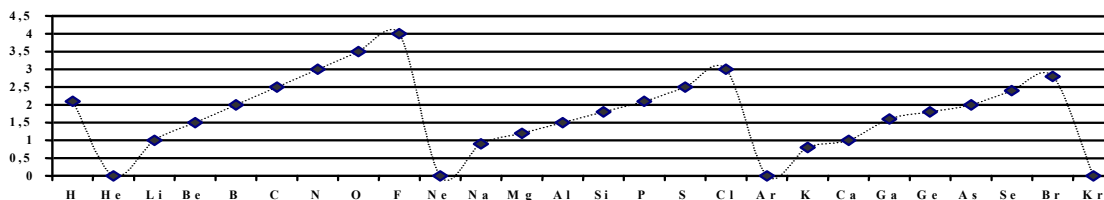
Answer: B

4. Which of the following elements has the greatest atomic radius?

- A) Boron (B)
- B) Lithium (Li)
- C) Neon (Ne)
- D) Nitrogen (N)

Answer: B

5. The graph below shows the electronegativity index of some elements of the periodic table.

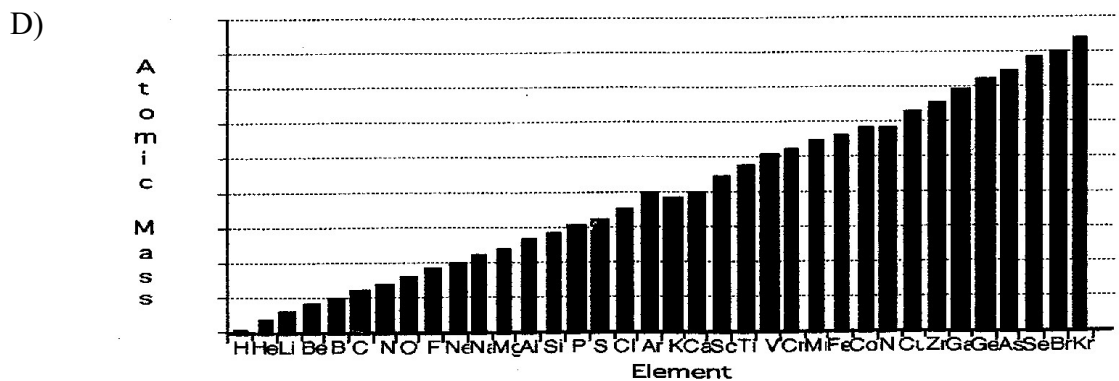
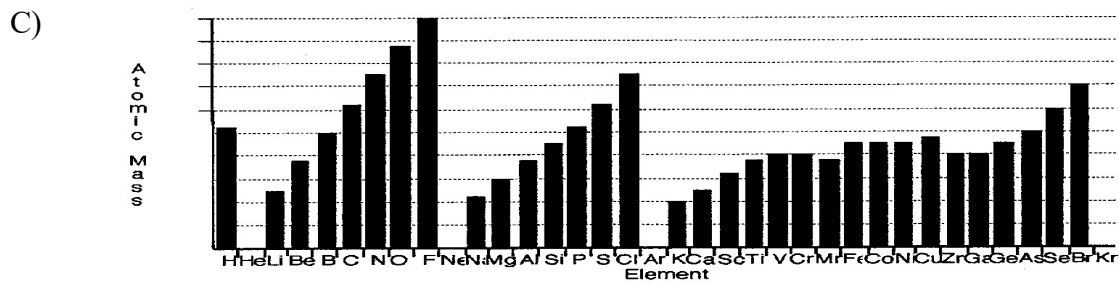
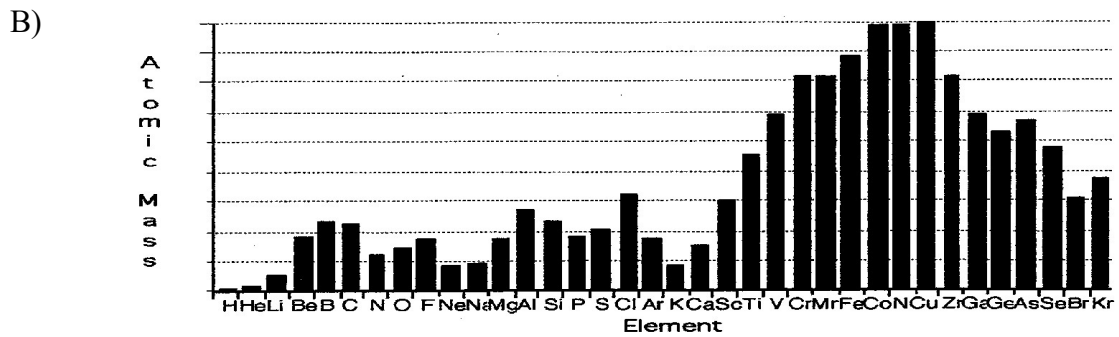
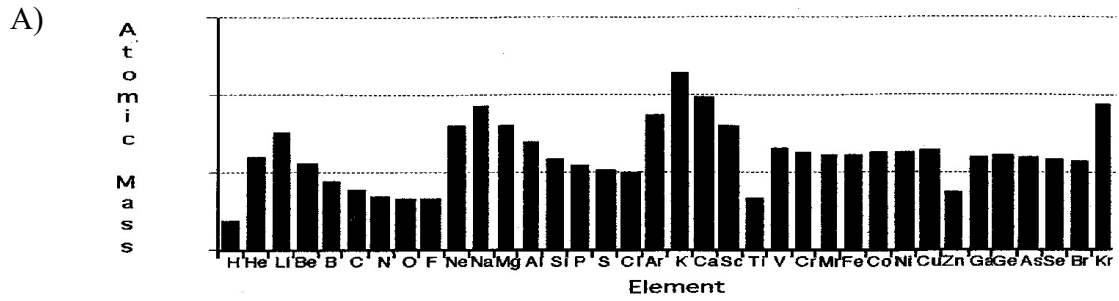


Which of the following statement is true?

- A) The electronegativity index steadily increases within the same family.
- B) The electronegativity index steadily increases, then drops to 0 within the same period.
- C) The electronegativity index remains constant within the same family period as one goes from left to right on the periodic table.
- D) The electronegativity index steadily decreases within the same period.

Answer: B

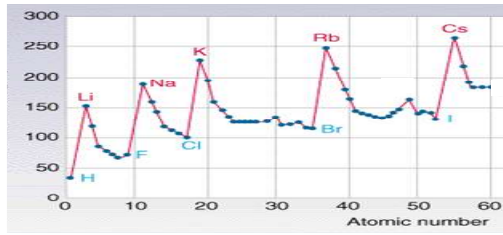
6. Which one of the following graphs represents the progression of the atomic masses in the periodic table?



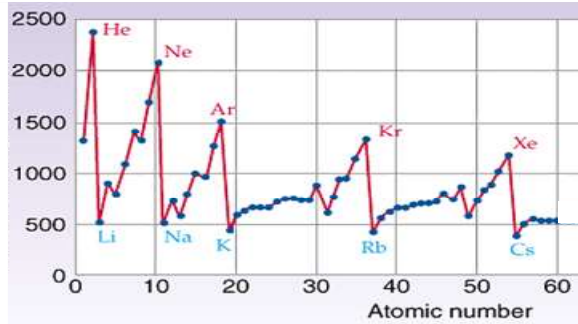
Answer: D

7. The following graphs illustrate various trends of the atoms on the periodic table.

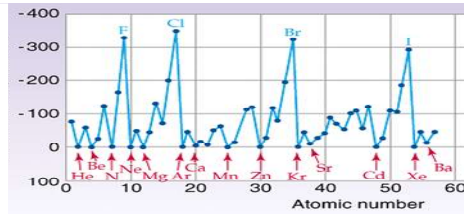
I



II



III

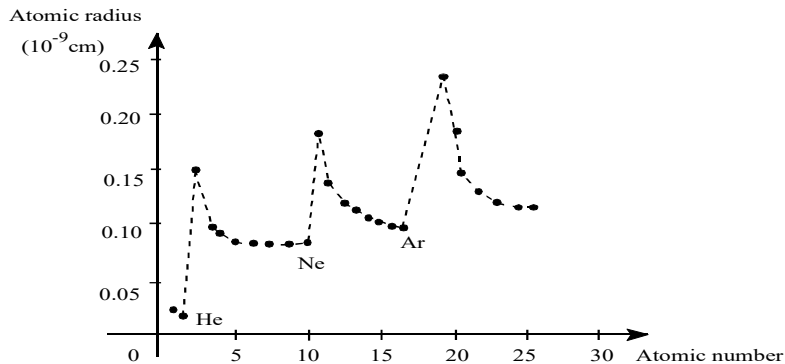


Which graphs represent the trend for ionization energy and for atomic radius?

- A) Ionization energy I and atomic radius II
- B) Ionization energy III and atomic radius II
- C) Ionization energy II and atomic radius III
- D) Ionization energy I and atomic radius III

Answer: A

8. The graph below illustrates the atomic radius of certain elements as a function of their atomic numbers.

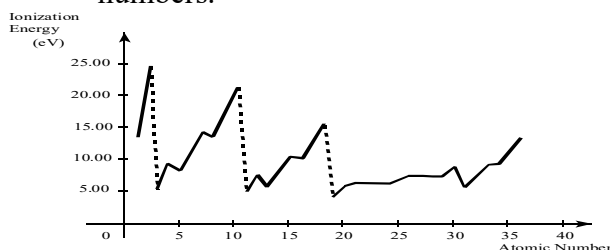


According to this graph, which statement best describes the change in the atomic radius as you move across a period?

- 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.

Answer: C

9. The following graph shows the ionization energies of certain elements as a function of their atomic numbers.

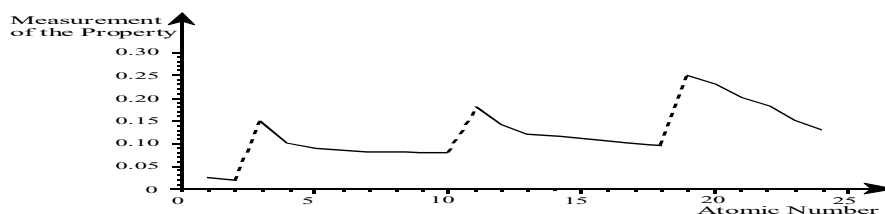


According to this graph, which of the following statements is TRUE?

- A) Within a period, the ionization energy usually increases as the atomic number increases.
- B) Within a period, the ionization energy usually decreases as the atomic number increases.
- C) In general, the ionization energy of the elements in Period 3 is greater than the ionization energy of the elements in Period 2.
- D) The ionization energy of the elements in Period 4 varies regularly when the atomic number increases regularly.

Answer: A

10. 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?

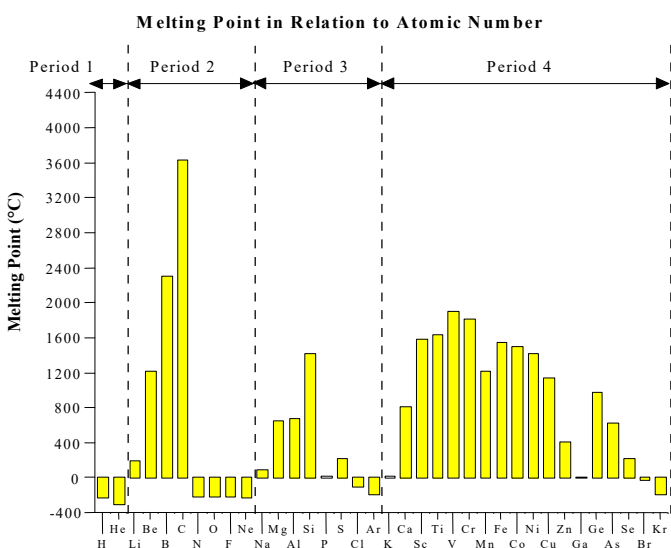
- A) The measurement of this property is always greater at the end of a period than at the beginning of a period.
- B) The measurement of this property decreases and then increases across a period.
- C) The measurement of this property decreases from left to right across a period.
- D) The measurement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

Answer: C

11. 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

Answer: D

12. The histogram below shows the distribution of the **melting points** of elements within the first four periods of the periodic table.

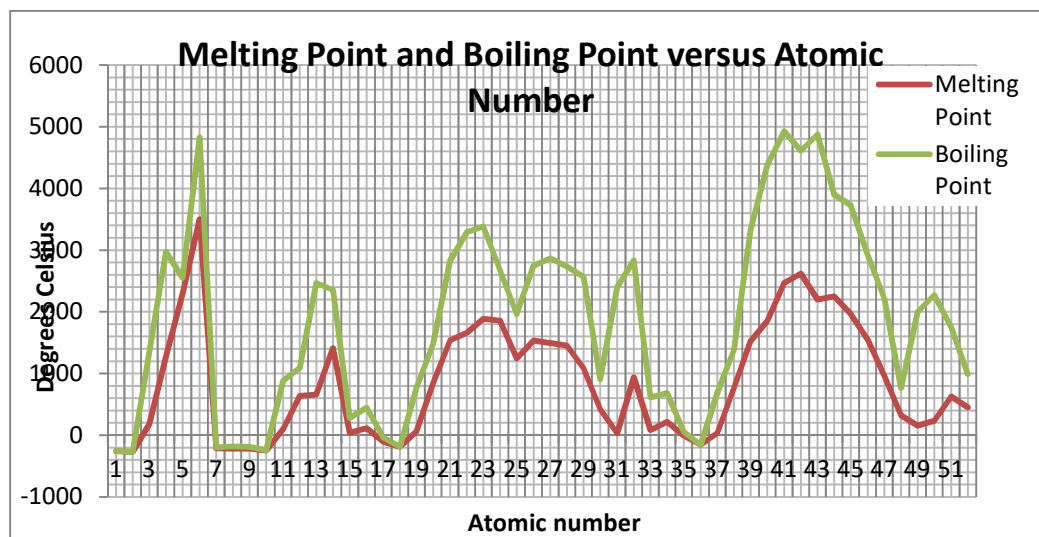


What pattern can be observed for the melting points?

- A) The melting points increase among the alkali metals.
- B) The melting points increase among the alkaline earth metals.
- C) The melting points increase among the halogens.
- D) The melting points increase among the metals across period 4.

Answer: C

13. The graph below represents the melting point and boiling point of element 1 to 52



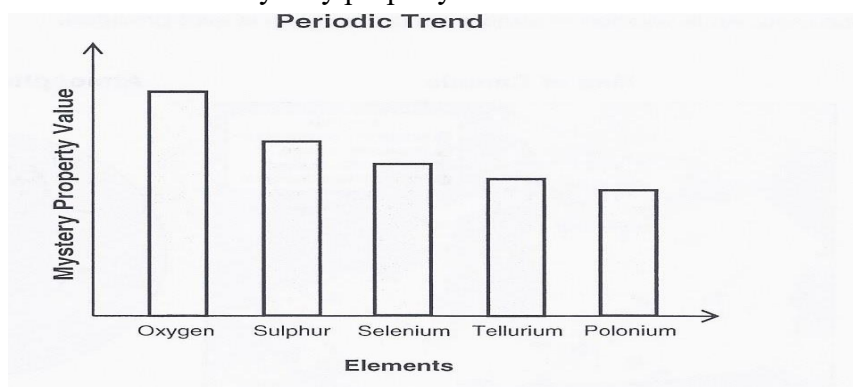
Data Taken from: <http://www.science.co.il/PElements.asp>

Which statement best describes the periodicity of melting point and boiling point for the first 52 elements of the periodic table?

- A) The melting point decreases within a period, whereas the boiling point increases
- B) The melting point increases within a period, whereas the boiling point decreases
- C) Both the melting point and boiling point increases, then decreases within a period
- D) Both the melting point and boiling point increases, then decreases within a period

Answer C

14. Periodic trends, arising from the arrangement of the periodic table, provide chemists with a valuable tool to quickly predict an element's properties. The graph below represents a periodic trend for a mystery property.



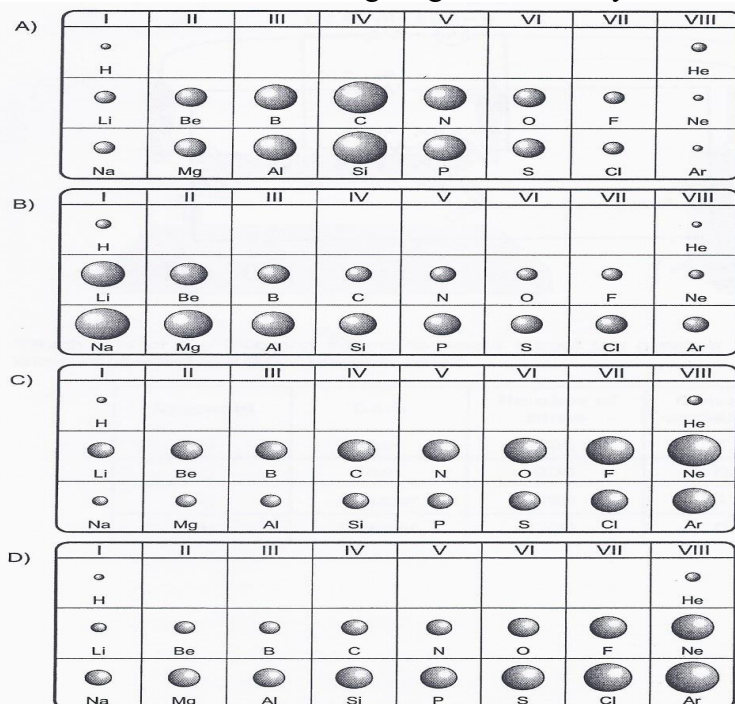
Which of the following correctly identifies the mystery property represented by the periodic table graph above?

- A) The size of the atomic radii
- B) The number of occupied electron shells
- C) The electronegativity of a particular group
- D) The chemical reactivity of a particular period

Answer: C

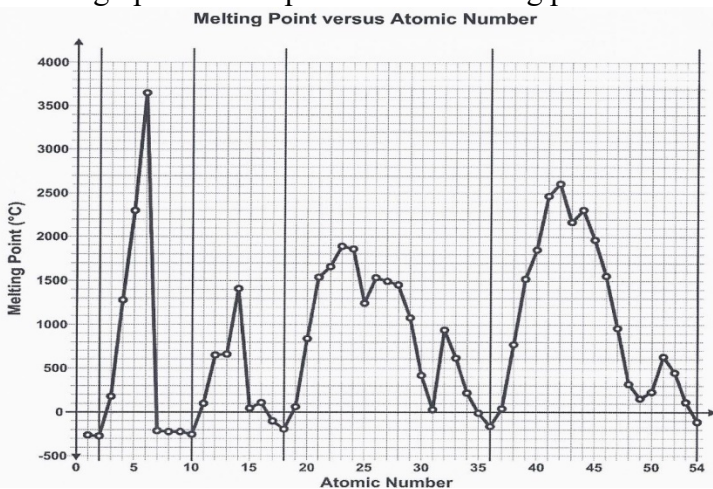


15. The atomic radius of elements changes across a period and within a family of the periodic table. Which of the following diagrams correctly illustrates these trends?



Answer: B

16. The graph below represents the melting points of elements 1 to 54.



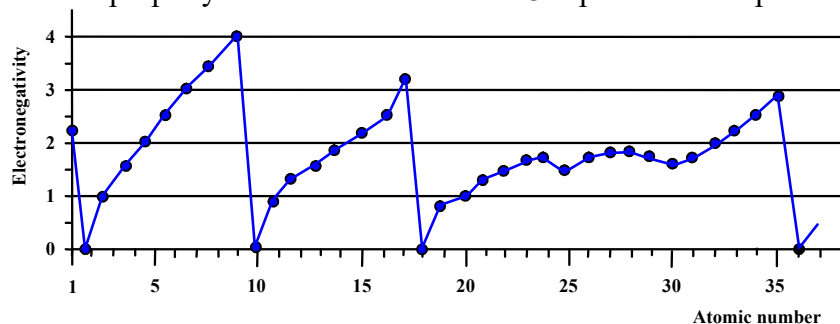
Which statement best describes the periodicity of melting point for the first 54 elements of the periodic table?

- A) The melting point decreases within a period.
- B) The melting point increases within a period.
- C) The melting point decreases then increases within a period.
- D) The melting point increases, then decreases within a period.

Answer: D

## Short Answer

17. 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.



Answer: Electronegativity increases as it goes across the period, but when it gets to group 8 it goes down to 0 because noble gases have no electronegativity energy.

18. Certain properties of elements and their description are listed below. Match the description with the correct property.

Description	Property
a) Determines the physical and chemical properties of an element.	1. Electronegativity
b) A pattern that occurs across a period or within a group of the periodic table.	2. Atomic radius
c) In the same period elements that have more protons in their nuclei tend to pull their electrons closer.	3. Electron configuration
d) Fluorine has a higher tendency to attract electrons than oxygen.	4. Chemical reactivity
e) The fewer electrons it has on the outermost shell, the more reactive a metal is.	5. Periodic trend

Answer: a-3, b-5, c-2, d-1, e-4