NARUMALAR ACADEMY - ONLINE COACHING CENTRE

DHARMAPURI – 81221 90917, 9988404061.

COLLEGE TRB – CHEMISTRY DEMO FILE

TOPIC: Chemical periodicity

1. The modern periodic law is based on:

A) Atomic radius

B) Increasing atomic number

C) Increasing atomic mass

D) Valence electrons only

Answer: B) Increasing atomic number

Explanation: Moseley showed that properties of elements depend on atomic number, not mass.

2. Elements in the same group of the periodic table have:

A) Same isotopes

B) Same atomic number

C) Similar chemical properties due to same valence electrons

D) Same atomic radius

Answer: C) Similar chemical properties due to same valence electrons

Explanation: Group elements share valence electronic configuration leading to similar reactivity.

3. Across a period from left to right, atomic radius:

A) First increases then decreases

B) Increases

C) Remains constant

D) Decreases

Answer: D) Decreases

Explanation: Nuclear charge increases while shielding is nearly constant, pulling electrons closer.

4. Ionization energy generally:

A) Remains constant everywhere

B) Decreases both across period and group

C) Decreases across a period and increases down a group

D) Increases across a period and decreases down a group

Answer: D) Increases across a period and decreases down a group

Explanation: Smaller size and higher nuclear charge increases IE across a period; larger atomic radius decreases IE down a group.

5. Which element has the highest electronegativity?

A) Nitrogen

B) Oxygen

C) Fluorine

D) Chlorine

Answer: C) Fluorine

Explanation: Fluorine has the highest effective nuclear charge and smallest size, hence maximum electronegativity.

6. Electron affinity is maximum for:

A) Neon

B) Oxygen

C) Fluorine

D) Chlorine

Answer: D) Chlorine

Explanation: Due to small size, fluorine has high repulsion, so chlorine shows higher electron affinity.

7. Which of the following has the largest atomic radius?

A) Cs

B) Li

C) Na

D) K

Answer: A) Cs

Explanation: Radius increases down the group, so Cesium has the largest size among alkali metals.

8. The diagonal relationship is observed between:

A) B & C

B) Li & Mg, Be & Al

C) Na & K

D) Ca & Sr

Answer: B) Li & Mg, Be & Al

Explanation: Elements show similar properties due to comparable ionic sizes and polarizing power diagonally.

9. Which period of the periodic table is the shortest?

A) Sixth

B) Seventh

C) First

D) Second

Answer: C) First

Explanation: The first period contains only 2 elements – Hydrogen and Helium.

10. Lanthanide contraction is caused by:

A) Decrease in nuclear charge

B) Poor shielding of 4f electrons

C) Increase in electron affinity

D) Increase in atomic number

Answer: B) Poor shielding of 4f electrons

Explanation: Inadequate shielding causes higher effective nuclear charge, reducing radii gradually.

11. The most metallic element among the following is:

A) Cs

B) Na

C) Al

D) Mg

Answer: A) Cs

Explanation: Metallic character increases down a group and decreases across a period, so Cs is most metallic.

12. The least metallic element is:

A) Oxygen

B) Fluorine

C) Chlorine

D) Neon

Answer: B) Fluorine

Explanation: Fluorine is the most electronegative element, hence least metallic.

13. The atomic radius of noble gases is usually measured by:

A) Ionic radius

B) Metallic radius

C) Covalent radius

D) van der Waals radius

Answer: D) van der Waals radius

Explanation: Noble gases do not form covalent bonds easily, so their size is measured using van der Waals radii.

14. Which among the following has the smallest ionization enthalpy?

A) K

B) Na

C) Li

D) Cs

Answer: D) Cs

Explanation: Down the alkali group, size increases, and outermost electron is removed easily.

15. The inert pair effect is observed mostly in:

A) Transition metals

B) Heavier p-block elements
C) Alkali metals
D) Lanthanides
Answer: B) Heavier p-block elements
Explanation: Poor shielding of inner d/f electrons makes the s-electrons reluctant to participate in bonding.
16. The atomic number of the element placed after Ne in the periodic table is:
A) 11
B) 12
C) 9
D) 10
Answer: A) 11
Explanation: After Neon (Z = 10), Sodium (Z = 11) starts the next period.
17. The anomalous behavior of the first element in a group is due to:
A) Small size, high electronegativity, absence of d-orbitals
B) Large size
C) High atomic mass
D) Presence of f-orbitals
Answer: A) Small size, high electronegativity, absence of d-orbitals
Explanation: First members like Li, Be, B, etc. differ because of unique properties.
18. Transition metals are placed in the periodic table because of:
A) Completely filled d-orbitals only
B) Filled p-orbitals
C) Partially filled d-orbitals
D) Only s-orbitals participation
Answer: C) Partially filled d-orbitals

Explanation: Transition elements have partially filled d-orbitals in atomic or ionic states.

19. Which halogen has the highest bond dissociation energy?

A) Cl2

B) Br2

C) I2

D) F2

Answer: A) Cl2

Explanation: Cl2 has maximum bond strength; F2 is weaker due to repulsion between small atoms.

20. Which of the following is a d-block element?

A) Al

B) Na

C) Fe

D) Ca

Answer: C) Fe

Explanation: Iron belongs to d-block due to electrons filling the d-orbitals.

21. Which noble gas does not have 8 electrons in its outer shell?

A) Ne

B) Ar

C) He

D) Kr

Answer: C) He

Explanation: Helium has 2 electrons in its valence shell (1s2).

22. Electronegativity across a period generally:

A) First increases then decreases

B) Increases

C) Remains constant

D) Decreases

Answer: B) Increases

Explanation: Due to increasing nuclear charge and decreasing atomic radius.

23. The element with highest second ionization energy is:

A) Be

B) Mg

C) Na

D) Li

Answer: D) Li

Explanation: After removing one electron, Li+ has a noble gas configuration, making the second removal very difficult.

24. Isoelectronic species are those which have:

A) Same nuclear charge

B) Same number of neutrons

C) Same number of electrons

D) Same atomic radius

Answer: C) Same number of electrons

Explanation: Example: N^{3-}, O^{2-}, F^{-}, Ne all have 10 electrons.

25. Which group of elements is known as chalcogens?

A) Group 16

B) Group 18

C) Group 17

D) Group 15

Answer: A) Group 16

Explanation: Oxygen family elements are called chalcogens.

26. Which of the following elements shows variable valency due to d-orbitals?

A) C

B) Fe

C) Na

D) Ar

Answer: B) Fe

Explanation: Transition elements like Fe can exhibit multiple oxidation states due to variable use of d-orbitals.

27. The most electronegative element among the following is:

A) Cl

B) O

C) F

D) N

Answer: C) F

Explanation: Fluorine has the highest electronegativity value of 4.0 on Pauling scale.

28. Which element belongs to Group 2 of the periodic table?

A) Na

B) Ca

C) Al

D) N

Answer: B) Ca

Explanation: Calcium is an alkaline earth metal in Group 2.

29. In the periodic table, atomic radius increases:

A) From right to left across a period

B) From top to bottom in a group

C) From bottom to top in a group

D) Both A and B

Answer: D) Both A and B

Explanation: Size increases down a group due to addition of shells, and from right to left due to lesser nuclear pull.

30. Which element has the lowest ionization energy in Group 1?

A) Na

B) Rb

C) Cs
D) K

Answer: C) Cs

Explanation: Cesium has the largest size and hence least ionization energy.