

PREVIOUS YEAR QUESTIONS

(Chapterwise)

CHAPTER NAME: PERIODIC TABLE, PERIODIC PROPERTIES AND VARIATIONS OF PROPERTIES

SUMMARY POINTS

Key Concept	Definition/Explanation	Formula/Notes
Periodic Trends	Patterns in properties like atomic size, ionization energy, electron affinity, and electronegativity across periods and groups.	- Across a period: Atomic size decreases, ionization energy and electronegativity increase. - Down a group: Atomic size increases, ionization energy and electronegativity decrease.
Ionization Potential	The energy required to remove the outermost electron from a gaseous atom.	- Decreases down a group (increased atomic size, shielding effect). - Increases across a period (greater nuclear charge, smaller size).
Electron Affinity	The energy released when an electron is added to a gaseous atom to form an anion.	- Generally increases across a period (atoms gain electrons more easily). - Decreases down a group due to increased atomic size and decreased nuclear attraction.
Electronegativity	The tendency of an atom to attract a shared pair of electrons in a compound.	- Higher electronegativity for smaller atoms and those with greater nuclear charge. - Most electronegative element: Fluorine (F).
Metallic Character	The ability of an atom to lose electrons and form positive ions.	- Increases down a group (lower ionization potential). - Decreases across a period (higher ionization potential).
Non-Metallic Character	The tendency of an atom to gain electrons and form negative ions.	- Decreases down a group (weaker nuclear pull on electrons). - Increases across a period (stronger nuclear pull on electrons).

	Reactivity of Metals	The ease with which a metal atom loses electrons to form positive ions.	- More reactive metals are lower in a group (easier electron loss). - Alkali metals (Group 1) are the most reactive.
	Reactivity of Non-Metals	The ease with which a non-metal atom gains electrons to form negative ions.	- More reactive non-metals are higher in a group (stronger electron gain tendency). - Halogens (Group 17) are the most reactive non-metals.
	Atomic Radius	Half the distance between nuclei of two atoms of the same element bonded together.	- Decreases across a period (higher nuclear charge pulls electrons closer). - Increases down a group (additional electron shells).
	Valence Electrons	The number of electrons in the outermost shell of an atom.	- Determines chemical reactivity and group number in the periodic table. - Elements in the same group have the same number of valence electrons.
	Electron Configuration	Arrangement of electrons in shells or energy levels of an atom.	- Follows Aufbau Principle, Hund's Rule, and Pauli Exclusion Principle. - Example: Sodium (Na): $1s^2 2s^2 2p^6 3s^1$.
	Groups and Periods	- Groups: Vertical columns; elements have similar chemical properties. - Periods: Horizontal rows; properties vary predictably across a period.	- Group 1: Alkali metals. - Group 17: Halogens. - Group 18: Noble gases. - Period number = number of electron shells.
	Inert Gases	Elements in Group 18 with completely filled outermost shells, making them chemically unreactive.	- Examples: Helium (He), Neon (Ne), Argon (Ar).

Key Notes

- **Trends and Their Implications:**
 - Higher ionization energy and electronegativity indicate stronger nuclear pull and smaller atomic radius.
 - Reactivity trends vary for metals and non-metals: Metals are more reactive down a group, while non-metals are more reactive up a group.
- **Examples to Remember:**
 - Most metallic element in Period 3: Sodium (Na).
 - Most electronegative element in Period 3: Chlorine (Cl).
- **Important Definitions:**
 - **Ionization Potential:** Energy to remove an electron.
 - **Electron Affinity:** Energy released on gaining an electron.
 - **Electronegativity:** Tendency to attract electrons in a bond.
- **Practice with Trends:**
 - Arrange elements by atomic radius, ionization energy, electron affinity, or metallic/non-metallic character using periodic table trends.

Q.NO.: 1	Assertion (A) : Assertion Reason: The tendency of losing electron increases down the group. Reason (R) : The most reactive metal is placed the top of group 1. (a) Both A and R are true,and R is the correct explanation of A (b) Both A and R are true,and R is the incorrect explanation of A (c) A is true but R is false (d) A is false but R is true	YEAR [2025]
ANS.:		
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Q.NO.: 1	State the term The tendency of an atom to attract the shared pair of electrons towards itself when combined in a compound	YEAR [2025]
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Q.NO.: 1		YEAR [2025]
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Q.NO.: 1	In the 2nd period Neon has maximum ionisation potential because: (a) It has unstable electronic configuration (b) It easily accepts electrons (c) It easily loses electrons (d) The outermost shell is completely filled.	YEAR [2024]
ANS.:	(d) The outermost shell is completely filled.	

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Q.NO.: 2	Electron Affinity is maximum in: (a) Mg (b) Ar (c) Li (d) Br	YEAR [2024]
ANS.:	(d) Br	
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Q.NO.: 3	State the term for the following: The tendency of an atom to pull a shared pair of electrons towards itself in a compound.	YEAR [2024]
ANS.:	electronegativity	
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Q.NO.: 4	Arrange the following as per the instructions given in the brackets: (a) Carbon, Fluorine, Beryllium (decreasing order of atomic size) (b) Potassium, Lithium. Sodium (Increasing order of ionization potential)	YEAR [2024]
ANS.:	(a)beryllium, Carbon, Fluorine (b)Potassium, Sodium,Lithium	
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Q.NO.: 5	Identify the following: (a) An element in period 1 which can be placed in both group 1 and group 17 of the periodic table. (b) The element having electronic configuration 2, 8, 6.	YEAR [2024]
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	(c) The most electronegative element of period 3.	
ANS.:	(a) Hydrogen (b) Sulphur (c) Chlorine	
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Q.NO.: 6	State the term/process for the following: The energy released when an atom in the gaseous state accepts an electron to form an anion.	YEAR [2023]
ANS.:	Electron Affinity	
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Q.NO.: 7	An element in period 3, whose electron affinity is zero: a. Neon b. Sulphur c. Sodium d. Argon	YEAR [2023]
ANS.:	(d) Argon	
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Q.NO.: 8	An element with the largest atomic radius among the following is: a. Carbon b. Nitrogen c. Lithium d. Beryllium	YEAR [2023]
ANS.:	c. Lithium	
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Q.NO.: 9	Arrange the following as per the instruction given in the brackets: (a) Al, K, Mg, Ca (decreasing order of its reactivity) (b) N, Be, O, C (increasing order of non-metallic character) (c) P, Si, F, Be (decreasing order of valence electrons)	YEAR [2023]
ANS.:	(a)K,Ca,Mg,Al (b)Be ,C,N,O (c)F, P ,Si ,Be	
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Q.NO.: 10	Define: Electronegativity.	YEAR [2023]
ANS.:	The tendency of an atom to pull a shared pair of electrons towards itself in a compound.	
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Q.NO.: 11	Give reason for the following: Ionisation potential decreases down a group.	YEAR [2023]
ANS.:	while moving down the group atomic size increases . So the force of attraction between the nucleus and the valency electrons is weaker. So it becomes easy to remove an electron from an atom.Thus the ionization decreases down the group	
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Q.NO.: 12	The most electronegative element from the following elements is: (a) Magnesium (b) Chlorine (c) Aluminium (d) Sulphur	YEAR [2019]
ANS.:	(b) Chlorine	

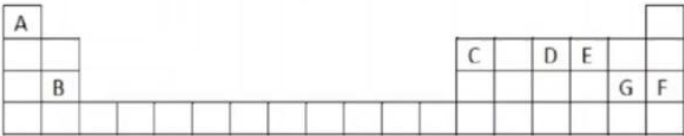
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Q.NO.: 13	In Period 3, the most metallic element is (sodium /magnesium / aluminium)	YEAR [2019]
ANS.:	sodium	
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Q.NO.: 14	Give the appropriate term defined by the statement given below: The tendency of an atom to attract electrons towards itself when combined in a covalent compound.	YEAR [2019]
ANS.:	electronegativity	
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Q.NO.: 15	Arrange the following according to the instructions given in brackets: (a) K, Pb, Ca, Zn. (In the increasing order of the reactivity) (b) Li, K, Na, H (In the decreasing order of their ionization potential) (c) F, B, N, O (In the increasing order of electron affinity)	YEAR [2019]
ANS.:	(a)Pb,Zn,Ca,K (b)H,Li,Na,K (c)B,N,O,F	
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Q.NO.: 16	Study the extract of the Periodic Table given below and answer the questions that follow. Give the alphabet corresponding to the element in question. DO NOT repeat an element.	YEAR [2019]
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	 (i) Which element forms an electrovalent compound with G? (ii) The ion of which element will migrate towards the cathode during electrolysis? (iii) Which non-metallic element has the valency of 2? (iv) Which is an inert gas?	
ANS.:	(i) B (ii) A (iii) E (iv) F	
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Q.NO.: 17	Give one word or a phrase for the following statements: The energy released when an electron is added to a neutral gaseous isolated atom to form a negatively charged ion.	YEAR [2018]
ANS.:	Electron Affinity.	
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Q.NO.: 18	Give reason: Ionisation potential increases across a period, from left to right.	YEAR [2018]
ANS.:	from left to right ,atomic size decreases and effective nuclear charge increases.so greater energy is required to remove an electron from its valence shell . Therefore ionization potential increases	
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Q.NO.: 19	In Period 3 of the Periodic Table, element B is placed to the left of element A. On the basis of this information, choose the correct word from the brackets to complete the following statements:	YEAR [2018]
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	(i) The element B would have (lower/higher) metallic character than A. (ii) The element A would probably have (lesser/ higher) electron affinity than B. (iii) The element A would have (greater/ smaller) atomic size than B	
ANS.:	(i)higher (ii)higher (iii)smaller	
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Q.NO.: 20	Fill in the blank from the choices given in brackets: The energy required to remove an electron from a neutral isolated gaseous atom and convert it into a positively charged gaseous ion is called (electron affinity, ionisation potential, electronegativity)	YEAR [2017]
ANS.:	ionisation potential	
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Q.NO.: 21	Match the atomic number 2, 4, 8, 15, and 19 with each of the following: (i) A solid non-metal belonging to the third period. (ii) A metal of valency 1. (iii) A gaseous element with valency 2. (iv) An element belonging to Group 2. (v) A rare gas.	YEAR [2017]
ANS.:	(i)15 (ii)19 (iii)8 (iv)4 (v)2	
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Q.NO.: 22	Arrange the following as per the instruction given in the brackets: (i) He, Ar, Ne (Increasing order of the number of electron shells) (ii) Na, Li, K (Increasing Ionisation Energy) (iii) F, Cl, Br (Increasing electronegativity) (iv) Na, K, Li (Increasing atomic size)	YEAR [2017]
ANS.:	(i)He,Ne,Ar (ii)K,Na,Li (iii)Br,Cl,F (iv)Li,Na,K	
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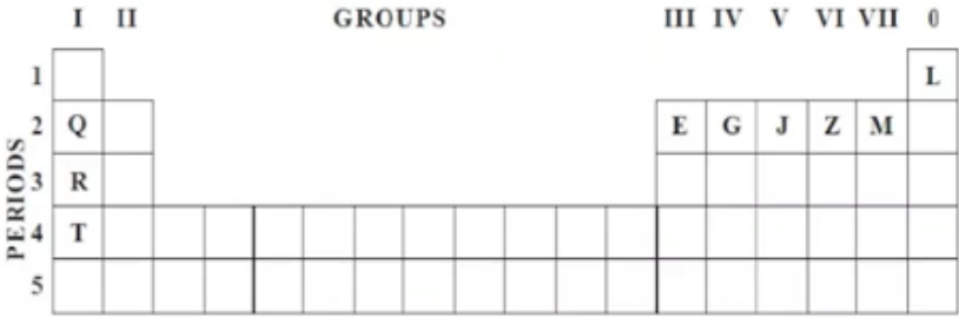
Q.NO.: 23	An element with the atomic number 19 will most likely combine chemically with the element whose atomic number is: (a) 17 (b) 11 (c) 18 (d) 20	YEAR [2017]
ANS.:	(17)	
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Q.NO.: 24	Identify the term/substance in each of the following: (i) The tendency of an atom to attract electrons to itself when combined in a compound. (ii) The electrons present in the outermost shell of an atom.	YEAR [2017]
ANS.:	(i)electronegativity (ii)valency	
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Q.NO.: 25	Rewrite the following sentences by using the correct symbol > (greater than) or < (less than) in the blanks given: a. The ionization potential of Potassium is __ that of Sodium. b. The electronegativity of Iodine is that of Chlorine.	YEAR [2017]
ANS.:	(a)The ionization potential of potassium < that of sodium. Potassium is below sodium in Group 1, and ionization potential decreases down a group. (b)The electronegativity of iodine < that of chlorine. Iodine is below chlorine in Group 17, and electronegativity decreases down a group.	
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Q.NO.: 26	Supply the missing word from those in the brackets (Do not write the sentence) (i) If an element has a low ionisation energy then it is likely to be (metallic/non-metallic). ii) If an element has seven electrons in its outermost shell then it is likely to have the__ (largest/smallest) atomic size among all the elements in the same period.	YEAR [2017]
ANS.:	If an element has a low ionization energy then it is likely to be metallic. Metals typically have low ionization energies due to their tendency to lose electrons easily. If an element has seven electrons in its outermost shell, then it is likely to have the smallest atomic size among all the elements in the same period. Elements with more electrons in their outermost shell have a stronger nuclear charge pulling the electrons closer, resulting in a smaller atomic size	
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Q.NO.: 27	Use the letters only written in the Periodic Table given below to answer the questions that follow:	YEAR [2017]
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	 (i) State the number of valence electrons in atom J. (ii) Which element has shown forms ions with a single negative charge? (iii) Which metallic element is more reactive than R? (iv) Which element has its electrons arranged in four shells?
ANS.:	5. Element J is in Group 15 (or Group 5), indicating it has 5 valence electrons.¹⁰ M. Elements in Group 17 (halogens) readily gain one electron to achieve a stable configuration, resulting in a single negative charge.¹⁰ T. Both R and T are in Group 1, and reactivity increases down a group. Therefore, T, being below R, is more reactive.¹⁰ R. Elements in the fourth period have four electron shells
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Q.NO.: 28	Among the elements given below, the element with the least electronegativity is: (a) Lithium (c) Boron (b) Carbon (d) Fluorine	YEAR [2015]
ANS.:	(a)lithium. Electronegativity increases from left to right across a period and from bottom to top in a group. Lithium, being on the leftmost side, has the least electronegativity.	
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Q.NO.: 29	The metals of Group 2 from top to bottom are Be, Mg, Ca, Sr, and	YEAR
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	Ba. (i) Which one of these elements will form ions most readily and why? (ii) State the common feature in the electronic configuration of all these element	[2015]
ANS.:	(i) Ba (Barium) will form ions most readily. As you move down a group, the atomic size increases, leading to a weaker force of attraction between the valence electrons and the nucleus. ¹¹ This makes it easier for barium to lose electrons and form ions (ii) All these elements belong to Group 2, so they all have two valence electrons in their outermost shell	
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Q.NO.: 30	Arrange the following as per the instructions given in the brackets: (a) Cs, Na, Li, K, Rb (increasing order of metallic character). (b) Mg, Cl, Na, S, Si (decreasing order of atomic size). (c) Na, K, Cl, S, Si (increasing order of ionization energy) (d) C1, F, Br, I (increasing order of electron affinity)	YEAR [2015]
ANS.:	(a) Increasing order of metallic character: Li < Na < K < Rb < Cs < Ca. Metallic character increases down a group (b) Decreasing order of atomic size: Na > Mg > Si > S > Cl. Atomic size decreases from left to right across a period. (c) Increasing order of ionization energy: K < Na < Si < S < Cl. Ionization energy increases from left to right across a period. ¹² Potassium has the lowest ionization energy because it is below sodium in the same group, and ionization energy decreases down a group (d) Increasing order of electron affinity: I < Br < F < Cl. Electron affinity generally decreases down a group; however, fluorine is an exception, and its electron affinity is lower than chlorine's	
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