

Chemistry

Reg.No. :

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(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately

(2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

Time : 01:00:00 Hrs

Total Marks : 70

PART – A

15 x 1 = 15

ANSWER ALL QUESTIONS:

- The electronic configuration of the elements A and B are $1s^2, 2s^2, 2p^6, 3s^2$ and $1s^2, 2s^2, 2p^5$ respectively. The formula of the ionic compound that can be formed between these elements is
(a) AB (b) AB_2 (c) A_2B (d) none of the above
- The group of elements in which the differentiating electron enters the anti penultimate shell of atoms are called
(a) p-block elements (b) d-block elements (c) s-block elements (d) f-block elements
- In which of the following options the order of arrangement does not agree with the variation of property indicated against it?
(a) $I < Br < Cl < F$ (increasing electron gain enthalpy) (b) $Li < Na < K < Rb$ (increasing metallic radius)
(c) $Al^{3+} < Mg^{2+} < Na^+$ (increasing ionic size) (d) $B < C < O < N$ (increasing first ionisation enthalpy)
- Which of the following elements will have the highest electro negativity
(a) Chlorine (b) Nitrogen (c) Cesium (d) Fluorine
- Various successive ionisation enthalpies (in kJ mol^{-1}) of an element are given below.

IE_1	IE_2	IE_3	IE_4	IE_5
577.5	1,810	2,750	11,580	14,820

 The element is
(a) phosphorus (b) Sodium (c) Aluminium (d) Silicon
- In the third period the first ionization potential is of the order
(a) $Na > Al > Mg > Si > P$ (b) $Na < Al < Mg < Si < P$ (c) $Mg > Na > Si > P > Al$ (d) $Na < Al < Mg < Si < P$
- The correct order of electron gain enthalpy with negative sign of F, Cl, Br and I having atomic number 9,17,35 and 53 respectively
(a) $I > Br > Cl > F$ (b) $F > Cl > Br > I$ (c) $Cl > F > Br > I$ (d) $Br > I > Cl > F$
- Which one of the following is the least electronegative element?
(a) Bromine (b) Chlorine (c) Iodine (d) Hydrogen
- The element with positive electron gain enthalpy is
(a) Hydrogen (b) Sodium (c) Argon (d) Fluorine
- The correct order of decreasing electronegativity values among the elements X, Y, Z and A with atomic numbers 4, 8, 7 and 12 respectively
(a) $Y > Z > X > A$ (b) $Z > A > Y > X$ (c) $X > Y > Z > A$ (d) $X > Y > A > Z$

- 11) The electronic configuration of the atom having maximum difference in first and second ionisation energies is
 (a) $1s^2, 2s^2, 2p^6 3s^1$ (b) $1s^2, 2s^2, 2p^6, 3s^2$ (c) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$ (d) $1s^2, 2s^2, 2p^6, 3s^2, 3p^1$
- 12) Which of the following is second most electronegative element?
 (a) Chlorine (b) Fluorine (c) Oxygen (d) Sulphur
- 13) In a given shell the order of screening effect is
 (a) $s > p > d > f$ (b) $s > p > f > d$ (c) $f > d > p > s$ (d) $f > p > s > d$
- 14) Which of the following orders of ionic radii is correct
 (a) $H^- > H^+ > H$ (b) $Na^+ > F^- > O^{2-}$ (c) $F > O^{2-} > Na^+$ (d) None of these
- 15) Assertion: Helium has the highest value of ionisation energy among all the elements known
 Reason: Helium has the highest value of electron affinity among all the elements known
 (a) Both assertion and reason are true and reason is correct explanation for the assertion
 (b) Both assertion and reason are true but the reason is not the correct explanation for the assertion
 (c) Assertion is true and the reason is false (d) Both assertion and the reason are false

PART – B

6 x 2 = 12

Answer six questions. Question No. 24 is compulsory. Answer any five from the remaining.

- 16) Define modern periodic law.
- 17) What are isoelectronic ions? Give examples.
- 18) What is effective nuclear charge?
- 19) Magnesium loses electrons successively to form Mg^+ , Mg^{2+} and Mg^{3+} ions. Which step will have the highest ionisation energy and why?
- 20) Define electro negativity.
- 21) Give the general electronic configuration of lanthanides and actinides.
- 22) What is the basic difference in approach between Mendeleev's periodic table and modern periodic table?
- 23) The element with atomic number 120 has not been discovered so far. What would be the IUPAC name and the symbol for this element? Predict the possible electronic configuration of this element.
- 24) The electron gain enthalpy of chlorine is 348 kJ mol^{-1} . How much energy in kJ is released when 17.5 g of chlorine is completely converted into Cl^- ions in the gaseous state?

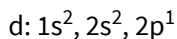
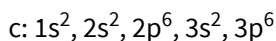
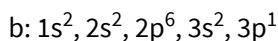
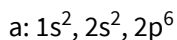
Part – C

6 x 3 = 18

Answer six question: Question No. 32 compulsory. Answer any 5 form the remaining

- 25) Energy of an electron in the ground state of the hydrogen atom is $-2.8 \times 10^{-18} \text{ J}$. Calculate the ionisation enthalpy of atomic hydrogen in terms of kJ mol^{-1} .
- 26) The electronic configuration of atom is one of the important factor which affects the value of ionisation potential and electron gain enthalpy. Explain.
- 27) In what period and group will an element with $Z = 118$ will be present?
- 28) Justify that the fifth period of the periodic table should have 18 elements on the basis of quantum numbers.

29) Elements a, b, c and d have the following electronic configurations:

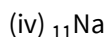
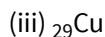


Which elements among these will belong to the same group of periodic table.

30) Why halogens act as oxidising agents?

31) Mention any two anomalous properties of second period elements.

32) Predict the periods and blocks to which each of the following elements belongs?



33) A student reported the ionic radii of isoelectronic species X^{3+}, Y^{2+} and Z^- as 136 pm, 64 pm and 49 pm respectively. Is that order correct? Comment

Part - D

5 x 5 = 25

Answer all five questions 34.

34) a) Explain the Pauling method for the determination of ionic radius.

(OR)

b) Explain the periodic trend of ionisation potential.

35) a) Explain the diagonal relationship.

(OR)

b) Why the first ionisation enthalpy of sodium is lower than that of magnesium while its second ionisation enthalpy is higher than that of magnesium.

36) a) By using Pauling's method calculate the ionic radii of K^+ and Cl^- ions in the potassium chloride crystal. Given that $r_{K^+} - r_{Cl^-} = 3.14 \text{ \AA}$.

(OR)

b) Explain the following, give appropriate reasons.

(i) Ionisation potential of N is greater than that of O.

(ii) First ionisation potential of C-atom is greater than that of B atom, whereas the reverse is true for second ionisation potential.

(iii) The electron affinity values of Be, Mg and noble gases are zero and those of N (0.02 eV) and P (0.80 eV) are very low.

(iv) The formation of $F^-(g)$ from $F(g)$ is exothermic while that of $O^{2-}(g)$ from $O(g)$ is endothermic.

37) a) What is screening effect? Briefly give the basis for Pauling's scale of electronegativity.

(OR)

b) State the trends in the variation of electronegativity in group and periods.

38) a) I.E increases as we move across the period but Ionisation enthalpies (I.E) of second period of elements in the order.

$\text{Li} < \text{B} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$

Explain why?

(i) Be has higher I.E and B

(ii) O has lower I.E than N & F

(OR)

b) Using Slater's rule calculate the effective nuclear charge on a 3p electron in aluminium and chlorine. Explain how these results relate to the atomic radii of the two atoms.
