

Chemistry

An opportunity to Win a 3 LPA package Job or Free* entry to main ESERF Exam 2024

CLASS XI

Chapterwise practice questions for CBSE Exams as per the latest pattern and marking scheme issued by CBSE for the academic session 2024-25.

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GENERAL INSTRUCTIONS

Maximum Marks: 70

- 1) All questions are compulsory.
- 2) Q. no. 1 to 5 are very short answer questions and carry 1 mark each.
- 3) Q. no. 6 to 12 are short answer questions and carry 2 marks each.
- 4) Q.no. 13 to 24 are also short answer questions and carry 3 marks each.
- 5) Q. no. 25 to 27 are long answer questions and carry 5 marks each.
- 6) Use log tables If necessary, use of calculators is not allowed.

Time Allowed: 3 hours

Classification of Elements and Periodicity in Properties | Chemical Bonding and Molecular Structure

1. Why do elements in the same group have similar chemical properties?
2. An element X belongs to the third period of the p-block. It has four electrons in the outermost shell. Deduce the atomic number of element 'X'.
3. How many resonance structures are possible for an SO_4^{2-} ion with a formal charge of (i) + 1 and (ii) + 2 on S?
4. Which has higher value (negative) of lattice enthalpy, NaCl or MgO? Why?
5. In terms of period and group where would you locate the element with $Z = 114$?
6. Why is NaCl a bad conductor of electricity in the solid state though it has ions present?
7. Explain why cations are smaller and anions are larger in radii than their parent atoms.
8. The C=O and C \equiv O bond lengths are generally 121 and 110 pm respectively. The actual C-O bond length in CO_2 is 115 pm. What does this suggest regarding the Lewis structure of CO_2 ?
9. Apart from tetrahedral geometry, another possible geometry for CH_2 is square planar with the four H-atoms at the corners of the square and the C-atoms at its centre. Explain why CH_4 is not square planar.
OR
Although geometries of NH_3 and H_2O molecules are distorted tetrahedral, bond angle in H_2O is less than that of NH_3 . Discuss.
10. Use the periodic table to answer the following questions.
(i) Identify an element with five electrons in the outer subshell.
(ii) Identify an element that would tend to lose two electrons.
(iii) Identify an element that would tend to gain two electrons.
(iv) Identify the group having element with metallic lustre, non-metal, liquid as well as gas at the room temperature.
11. All transition elements are d-block elements, but all d-block elements are not transition elements. Explain.
12. Which of the following will have the most negative electron gain enthalpy and which have the least negative? P, S, Cl and F
13. How many electron pairs available in the valence shell of (i) N in NH_3 (ii) P in PCl_3 (iii) C in CO_2 (iv) N in NH_4^+ (v) P in PCl_5 (vi) S in H_2S
14. Which of the following pairs of elements would have a higher negative electron gain enthalpy? (i) O or F (ii) For Cl (iii) N or O Give reasons.
15. (i) Find the total number of σ - and π -bonds and lone pair of electrons in a molecule of CH_3COOH .
(ii) Predict the state of hybridisation of the central atom in (a) IF_5 and (b) CO_2 . Also, predict the shape of these molecules.
16. (i) Define electronegativity. How does it differ from electron gain enthalpy. (ii) State diagonal relationship.
17. What are the various factors due to which the ionization enthalpy of the main group elements tends to decrease down a group?
OR
Among the second period elements the actual ionization enthalpies are in the order $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$.

Chemistry

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Explain why (i) Be has higher A, H than B (ii) O has lower A, H than N and E.

18. (i) Explain why BeH₂ molecule has zero dipole moment although Be-H bonds are polar.

(ii) Arrange the following in increasing order of ionic character: C-H, H-Cl, H-Br, K-F, Na-I

(iii) The percentage ionic character in a certain bond between A and B is 75% and the bond distance A-B is 155 pm.

What is the dipole moment of AB molecule?

19. Compare the relative stability of the following species and indicate their magnetic properties: O₂, O₂⁺, O₂⁻ (superoxide ion), O₂²⁻ (peroxide ion)20. The formation of F_(g)²⁻ from F_(g) is exothermic whereas that of O_(g)²⁻ from O_(g) is endothermic. Explain.

21. Among the elements B, Al, C and Si:

(i) Which has the highest first ionization enthalpy?

(ii) Which has the most negative electron gain enthalpy?

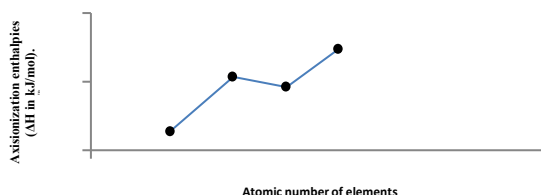
(iii) Which has the most metallic character? Give reasons of all.

22. (i) Use molecular orbital theory to explain why Be₂ molecule does not exist.

(ii) What is the significance of plus and minus signs when representing an orbital?

(iii) The experimentally determined N-F bond length in NF₃ is greater than the sum of the single covalent radius of N and F. Explain.23. (i) Using VSEPR theory, draw the shape of PCl₅ and BrF₅.(ii) Describe the change in hybridisation (if any) of Al atom in the following reaction: AlCl₃ + Cl⁻ → AlCl₄⁻24. (i) Explain why Δ_iH₁ of Na is lower than that of Mg but Δ_iH₂ of Na is higher than that of Mg.(ii) The first, second and third ionization enthalpies of an element E are 419, 3069 and 4400 kJ mol⁻¹. To which group of the periodic table does E belong?

25. Ionisation enthalpies of elements of second period are given below: Ionisation enthalpy/kcal mol: 520, 801, 899, 1086, 1314, 1402, 1681, 2080. Match the correct enthalpy with the elements and complete the graph given in figure.



Atomic Number	Element	Ionization Enthalpy (ΔH)
1	H	1312
2	He	2372
3	___	520
4	___	899
5	___	800
6	___	1086
7	___	1402
8	___	1314
9	___	1681
10	___	2080
11	Na	496

Which elements have the following electronic configuration?

(i) 1s² 2s² 2p³ (ii) [Ar] 4s² 3d¹⁰ 4p¹ (iii) [Xe] 6s² (iv) [Xe] 6s² 5d¹ 4f⁷ (v) [Ar] 4s¹ 3d¹⁰

26. (i) The H-O-H bond angle in the water molecule is 105°. The H-O bond distance is 0.94 Å. The dipole moment of the molecule is 1.85 D. Calculate the charge on oxygen atom.

(ii) In SF₄ molecule, the lone pair of electrons occupies an equatorial position in the overall trigonal bipyramidal arrangement in preference to an axial position. Why?

OR

Discuss the shapes of following molecules using VSEPR model: BeCl₂, BCl₃, SiCl₄, AsF₅, H₂S

27. (i) Explain why the chemical reactivity increases in the order Li < Na < K < Rb < Cs in group 1 but decreases in the order F > Cl > Br > I in group 17 in periodic Table.

Chemistry

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(ii) Arrange the given elements in the correct order of their chemical reactivities. F, Cl, O and N?

(iii) Arrange HClO_4 , HClO_2 , HClO and HClO , in order of acidic nature.

OR

(i) Arrange the elements Na, Mg, K, Cs, Al and B in order of decreasing metallic character. Explain briefly.

(ii) Which of the following atoms / ions are isoelectronic?

Al^{3+} , F, Cl^- , O^{2-} , Na, Mg^{2+}

Arrange the isoelectronic ions in decreasing order of their sizes.

(iii) Is the second electron gain enthalpy of O expected to be positive, more negative or less negative than the first?

Periodic Table

1 H Hydrogen																	2 He Helium														
3 Li Lithium	4 Be Beryllium															5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon										
11 Na Sodium	12 Mg Magnesium															13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon										
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton														
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon														
55 Cs Caesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon														
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson														
																		58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
																		90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Alkali metals

Alkaline earth metals

Transition metals

Post-transition metals

Metalloids

Reactive non-metals

Noble gases

Lanthanides

Actinides

Unknown properties

ESERF Exam : December 2024 for "Assistant Job"

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Last date of registration : 15 November 2024, 6 pm.

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