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HALF YEARLY EXAMINATION-2024-25
CLASS-XI
SUBJECT-CHEMISTRY

Time Allowed::3hours Maximum Marks: 70

General Instructions:

a. There are 33 questions in this question paper with internal choice.
b. SECTIONA consists of 16 multiple-choice questions carrying1mark each.
c. SECTIONB onsistsof 5 very short answer questions carrying 2 marks each.
d. SECTIONC consists of 7 short answer questions carrying 3 marks each.
e. SECTIOND consists of 2 case-based questions carrying 4 marks each.
f. SECTIONE consists of 3 long answer questions carrying 5 marks each.
g. All questions are compulsory.
h. The use of log table sand calculators is not allowed.

SECTION-A		
1	Which one will have maximum numbers of water molecules?(A)18molecules of water (B) 1.8grams of water (C) 18grams of water (D)18moles of water	1
2	……. is the mass percentage of carbon in carbodioxide?	1
3	The second ionization enthalpies of Na,Mg,Al and Si are in the order:…….	1
4	Consider the following species: N^{3-}, O^{2-}, F^{-}, Na^{+}, Mg^{2+}, Al^{3+} What is common in them? (a)Radius(b)No.of protons(c)No.of nucleons(d)No.of electrons	1
5	Azimuthal quantum number determines the……	1
6	The electronic configuration of Co^{2+} ion is…….	1

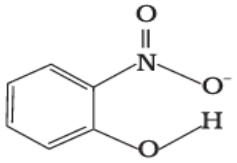
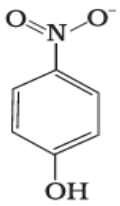
7	Transition metals belongs to (a) Group number1to2 (b) Group number13to18 (c) Group number3to12 (d) Group number1to8	1
8	A certain orbital has no angular nodes and two radial nodes. The orbital is- (a) 2p (b) 3p (c) 3s (d) 2s	1
9	The volume of gas is reduced to 1/8 from its original volume. The specificheatwill be……	1
10	In the reaction, $2SO_3 \rightleftharpoons 2SO_2 + O_2$ The unit of equlibrium constant K_c is :	1
	(a) $mole^{-2}$ $lit.^{-1}$ (b) $mole^2$. lit. (c) mole. lit. (d) mole. $lit.^{-1}$	
11	A measured temperature on Fahrenheit scale is 200F. What will this reading be on the Celsius Scale? (a)40 ℃ (b)94 ℃ (c)93.3℃ (d)30℃	1

12	The correct bond order in the following species is— — — — —. (a)$O_2^+ < O_2^- < O_2^{2+}$ (b)$O_2^- < O_2^+ < O_2^{2+}$ (c) $O^{2+} < O^+ < O^-_{2\,2\,2}$ (d)$O_2^{2+} < O_2^- < O_2^+$	1
	Forquestions13-16 (a) Both A and R are the true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) Both A andR are false.	
13	Assertion (A): One atomic mass unit is defined as one-twelfth of the mass of onecarbon-12atom. Reason (R): Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.	1
14	Assertion(A):Atoms with completely filled and half-filled subshells are stable.	1
	Reason (R) : Completely filled and un-filled subshells have the symmetrical distribution of electrons and have maximum exchange energy.	
15	Assertion:BF3 molecule has zero dipole moment.Reason :B is electronegative and B–F bonds are polar in nature.	1
16	Assertion(A):If two systems are in thermal equilibrium with the third then all the three systems will be in thermal equilibrium with one another. Reason(R):Zeroth Law of thermodynamics was given before first Law.	1
	SECTION-B	
17	What is the molar concentration of sugar $C_{12}H_{22}O_{11}$ if it's 2gm are dissolved in enoughwatertomakefinalvolume2L	2
18	(i) In O^{-2}.and F^-, which one would have larger size? (ii) Among alkali metals which element do you expect to be least electronegative?	1+1
19	The enthalpy of the atomisation for the reaction $CH_4(g) \longrightarrow C(g) + 4H(g)$ is 1665 K.J. $mole^{-1}$ what is the bond of energy of the C-Hbond?	1 1
20	In a process, 700 J of heat is absorbed by a system and 390 J of work is done by the system.What is the change in internal energy for the process? OR Calculate the number of kj of heat necessary to raise the temperature of60g of aluminium from35°Cto55°C.Molar heat capacity of Al is $24 Jmol^{-1}K^{-1}$.	2

21	What is Kc for the following equilibrium when the equilibrium concentration of each substance is: [SO2] = 0.6 M, [O2] = 0.82M, and [SO3] = 1.9 M ? $2SO_2 + O_2 \rightleftharpoons 2SO_3$	1 1
	SECTION-C	
22	(i) An atomic orbital has n = 3. What are the possible values of l and m_l ? (ii) List the quantum numbers m_l and l of electron in 3rd orbital. (iii) Which of the following orbitals are possible ? $1p_y$, 2s, $2p_x$,3f,5g,4f,1f and $2d_{X2-Y2}$	1+1 +1
23	4 liters of water are added to 2 lt. of 6 molar Hcl solutions. what is the molarity of resulting solution?	1 1 1
24	(i) Define adiabatic system. (ii) What are the values of work done, internal energy and heat for isothermal free expansion of an ideal gas? (iii) Explain state and path functions with an example of each.	1 1 1
25	Draw enrgy level diagram of O_2. Also calculate bond order and explain magnetic character in O_2.	3
26	Kp = 0.04 atm at 899 k for the equilibrium shown below. what is the equilibrium concentration of C2H6 when it is placed in a flask at 4 atm. pressure and allowed to come to equilibrium? $C_2H_6 \rightleftharpoons C_2H_4+H_2$	3
27	An element X with atomic number 112 has been recently predicted. Its electronic configurationis: [Rn] $5f^{14}6d^{10}7s^2$ .Predict i. itsgroup ii. block in which this element would be placed iii. IUPAC name and symbol.	 1 1 1
28	In a reaction A +2 B → AB2 Identify the limiting reagent in the following reaction mixtures. (i) 300 atoms of A + 200 molecules of B (ii) 2 mol of A + 3 mol of B (iii) 100 atoms of A + 100 molecules of B (iv) 5 mol of A + 2.5 mol of B (v)2.5 mol of A + 5 mol of B (vi)3gm of A +5 gm of B	3
	SECTION-D	

29	Read the passage given below and answer the following questions: Hybridisation helps us to understand the geometry of molecules.This is because hybridized orbital sare directed in space in some preferred direction to have stable arrangement , which determine the geometry.The presence of lone pairs in addition to bond pairs distortthe geometry due to repulsion. a) What is the hybridization of Sulphur inSF_4 b) Give example of molecule having trigonal planer geometry. c. Give shape of the molecule having four bond pairs and one lonepair. d. Distinguish coaxial and collateral overlapping with example.	1 1 1 1
30	Read the passage given below and answer the following questions: In the periodic table electronegativity increases from left to right in a period and decreases from top to bottom in a group. The non-metallic character of an element is directly related to the electronegativity while the metallic character is inversely related to it. a.The element with maximum electronegativity belongs to(a)Period-1,Group-18 (b)Period-2,Group-17(c)Perio d-3,Group-17 (d)Period-2, Group-1. b.Which of the following groups contains metals, non-metals as well as metalloids?(a)Group-1 (b) Group-17(c) Group-14(d)Grou p-2.	1 1

	c.The least, metallic element of group-13 is(a)Aluminium (b) Boron (c) Gallium (d)Indium.	1
	d.The electronegativity decreases with (a)decrease in nuclear charge (b)increase in atomic mass (c)decrease in atomic size (d)increase in atomic number.	1
	SECTION-E	
31	a.The bromine atom possesses 35 electrons that contain 6 electrons in 2p orbital, 6 electrons in 3p orbital and 5 electrons in 4p orbital. Which of these electrons experiences the lowest effective nuclear charge?	1
	b.The arrangement of the orbitals is based upon the energy based on the (n+l) value. The lower the value of the (n+l), the lower energy found. For orbitals with equal values of (n+l), the orbital with the lower value of n will have the lower energy. Based upon the above-given information, arrange the following orbitals in the increasing order of their energy (a) 1s, 2s, 3s, 2p (b) 4s, 3s, 3p, 4d (c) 5p, 4d, 5d, 4f, 6s (d) 5f, 6d, 7s, 7p	1 1
	c. Wavelengths of the following different radiations have given below : λ(A) = 300 nm λ(B) = 300 μm λ(c) = 3 nm λ (D) 30 A°	1
	Arrange the following radiations in the increasing order of their energies.	
	d. The Balmer series in the hydrogen spectrum corresponds to the transition from n1 = 2 to n2 = 3,4,..... This series lies in the visible region. Calculate the wave number of lines associated by the transition in the Balmer series if the electron moves to n = 4 orbit. (RH= 109677 cm-1)	1

32	1. The net enthalpy change for the reaction is the amount of energy needed to break all the bonds from the reactant molecules minus the amount of energy needed to form all the bonds in the product molecules. What will be the enthalpy change for the given reaction? $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ Given that the Bond energy of the H_2, Br_2 and HBr is 435 kJ mol-1, 192 kJ mol-1, as well as 368 kJ mol-1, respectively. 2. Expansion of the gas in the vacuum is called free expansion. Calculate the work done as well as the change in the internal energy if 1 litre of the ideal gas expands isothermally into a vacuum until the total volume is 5 litres? 3. Entropy on boiling of egg .....whereas curding of milk.....	2 2 1
33	(i) Structures of molecules of two compounds are given below:  (I)  (II) (a) Which of the two compounds will have intermolecular hydrogen bonding and which compound is expected to show intramolecular hydrogen bonding. (b) Which of the above two compounds will show lower melting point. Why? (c) Solubility of compounds in water depends on power to form hydrogen bonds with water.Which of the above compounds will form hydrogen bond with water as easily and be more soluble in it	 2 1 2