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Super Easy chemistry By

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Chemistry Half Yearly Paper

M.T : 90 Min. | Date: | M.M : 70

Class 11_Physical & In-Organic Chemistry

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Half Yearly Examination for Class 11th

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Unit No.	Unit Name
Unit I	Some Basic Concepts of Chemistry
Unit II	Structure of Atom
Unit III	Classification of Elements and Periodicity in Properties
Unit IV	Chemical Bonding and Molecular Structure
Unit V	Redox Reactions

General Instructions:

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. The use of log tables and calculators is not allowed

Think Big…Think +ve…Think ANJIT

Section 'A' __ 1 marks

1. Match the following:

Column A	**Column B**
i. Number of millimoles	a. $\frac{\text{Molarity}}{\text{Valency}}$
ii. Number of milliequivalents	b. Normality × volume in mL
iii. Normality	c. Valency × molarity
	d. Molarity × volume in mL

a) i - b, ii - d, iii - a
b) i - d, ii - b, iii - c
c) i - a, ii - b, iii - d
d) i - d, ii - c, iii - b

2. Find the INCORRECT match.

a) Solid with highest density - Os
b) Liquid with highest density - Hg
c) Non-metal with highest melting point - S
d) Metal with highest melting point - W

3. The wavelength of a ball of mass 0.1 kg moving with a velocity of 10 ms^{-1} will be:

a) 6.626×10^{-35} m
b) 6.626×10^{-34} m
c) 7.626×10^{-34} m
d) 6.626×10^{34} m

4. The total energy of an electron in the first excited state of the hydrogen atom is about −3.4 eV. What is the kinetic energy of the electron in this state?

a) +1.7 eV
b) +3.4 eV
c) -3.4 eV
d) +6.8 eV

5 . Which of the following are not redox reactions?

a) $K_4[Fe(CN)_6] + H_2SO_4 + H_2O \rightarrow K_2SO_4 + CO + FeSO_4 + (NH_4)_2SO_4$.

b) $CuSO_4 + NH_3 \rightarrow [Cu(NH_3)_4SO_4$.

c) $Mg + N_2 \rightarrow Mg_3N_2$.

d) $I_2 + 3Cl_2 \rightarrow 2ICl_3$

a) a, b

b) b, d

c) b only

d) c, d

6. Choose one of the following in the order of increasing radii:

a) $I^+ < I^- < I$

b) $I < I^+ < I^-$

c) $I^- < I^+ < I$

d) $I^- > I > I^+$

7 . In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is (are):

a) sp^2 and sp^3

b) Only sp^2

c) sp^2 and sp

d) sp and sp^3

8. Which of the following are arranged in an increasing order of their bond strengths?

a) $O_2– < O_2 < O_2+ < O_2^{2-}$

b) $O_2^{2-} < O_2– < O_2 < O_2+$

c) $O_2– < O_2^{2-} < O_2 < O_2^+$

d) $O_2+ < O2 < O_2– < O_2^{2-}$

9. In which of the following pairs, the two molecules have identical bond orders:

a) N_2 , O_2^{2+}

b) N_2 , $O_2–$

c) $N_2–$, O_2

d) O_2^{2-} , N_2

10. With regard to the species $^{16}O^{2-}$, ^{19}F- and ^{20}Ne, which of the following statements is correct?

a) All three species contain 10 electrons.

b)The sum of the neutrons in all three species is 27.

c) The sum of the protons in all three species is 28.

d) Both ^{19}F- and ^{20}Ne contain 20 neutrons.

11. If the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.9 g L molarity of glucose in blood?

a) 5M

b) 50M

c) 0.005 M

d) 0.5 M

12. The Elements X, Y Combine to Form Two Compounds as XY and X2Y. Find the Atomic Weight of X and Y, When the Weight of 0.1 Moles of XY is 10g and 0.05 Moles of X2Y is 9g.

a) 60, 40

b) 80, 20

c) 30, 20

d) 20, 30

13. Boron exists as Two Stable Isotopes as ^{10}B (19%) and ^{11}B (81%). Find out the Average Atomic Weight of Boron as per the Periodic Table.

a) 10.0

b) 10.5

c) 11.4

d) 10.8

14. Which of the following sets of quantum number is INCORRECT?

a) n=3, l=4, m=0, s = +1/2

b) n=3, l=3, m=+3, s = +1/2

c) n=6, l=0, m=+1, s = -1/2

d) n=4, l=2, m=+2, s = 0

15. **Assertion (A):** Matter waves consist of oscillating electric and magnetic fields.

Reason (R): Matter waves require medium for propagation.

a) Both A and R are 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) A is false but R is true.

16. **Assertion (A):** Atomic mass has no unit but is expressed in amu.
Reason (R): It is the average mass of an atom taking care of the relative abundance of all its possible isotopes.

a) Both A and R are 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) A is false but R is true.

Section 'B' __ 2 marks

17. The density of the water at room temperature is 1.0 g/mL. How many molecules are there in a drop of water if its volume is 0.05 mL?
18. Define electron gain enthalpy. What is its unit ? Discuss the factors which influence the electron gain enthalpy.
19. (b) State Heisenberg's Uncertainty Principle.
(c) What is the wavelength of light emitted when the electron in a hydrogen atom undergoes a transition from an energy level with n = 4 to an energy level with n = 2?
20. 0.12 g of an organic compound containing phosphorous gave 0.22 g of $Mg_2P_2O_7$ by usual analysis. Calculate the percentage of phosphorous in the compound.
21. In Rutherford's experiment, generally the thin foil of heavy atoms, like gold, platinum etc. have been used to be bombarded by the α -particles. If the thin foil of light atoms like aluminium etc. is used, what difference would be observed from the above results?

Section 'C' __ 3 marks

22. A. How many significant figures should be present in the answer of the following calculations?
i. $\frac{0.02856 \times 298.15 \times 0.112}{0.5785}$
ii. 5×5.364
iii. 0.0125 + 0.7864 + 0.0215
B . What is the difference between molality and molarity?
23. What are the oxidation numbers of the $(NH_4)_2Cr_2O_7$, $Na_2S_4O_6$, $Fe(CO)_5$, H_2SO_5 and how do you rationalise your results?
24. A. What is de Broglie wavelength.
B. Dual behaviour of matter proposed by de Broglie led to the discovery of electron microscope often used for the highly magnified images of biological molecules and other types of material. If the velocity of the electron in this microscope is 1.6×10^6 ms^{-1}, Calculate de Broglie wavelength associated with this electron.
25. Explain the structure & Hybridization, Geometry, Shape , Bond angle of given molecule CO_3^{2-} & H_2O
26. Calculate the empirical and molecular formula of the compound having the following percentage composition :
Na = 36.5%, H = 0.8%, P = 24.6%, O = 38.1%
The molecular mass of the compound is 126 a.m.u. Also name the compound
27. Write the energy level diagram and calculate Bond Order and its Magnetic nature of O_2^- ion.
28. (I) The mass of an electron is 9.1 × 10–31 kg. If its K.E. is 3.0 × 10–25 J, calculate its wavelength.
(II) A 25-watt bulb emits monochromatic yellow light of the wavelength of 0.57μm. Calculate the rate of emission of quanta per second.

Section 'D' __ 4 marks

29. **Read the following text carefully and answer the questions that follow:**

The orbital wave function or ψ for an electron in an atom has no physical meaning. 1s orbital the probability density is maximum at the nucleus and it decreases sharply as we move away from it. After reaching a small maxima it decreases again and approaches zero as the value of r increases further. These probability density variation can be visualised in terms of charge cloud diagrams. Boundary surface diagrams of constant probability density for different orbitals give a fairly good representation of the shapes of the orbitals. A boundary surface or contour surface is drawn in space for an orbital on which the value of probability density $|\psi|^2$ is constant. The size of the s orbital increases with increase in n, that is, 4s > 3s > 2s > 1s and the electron is located further away from the nucleus as the principal quantum number increases.

i. Why is the energy of 1s electron lower than 2s electron? (1)

ii. Why don't we draw a boundary surface diagram within the probability of finding the electron is 100%? (1)

iii. Calculate the total number of angular nodes and radial nodes present in the 3p orbital. (1)

iv. Describe the shape of s orbitals? (1)

30. **Read the following text carefully and answer the questions that follow:**

In order to explain the characteristic geometrical shapes of polyatomic molecules, Pauling introduced the concept of hybridisation. The orbitals undergoing hybridisation should have nearly the same energy. There are various type of hybridisations involving s, p and d-type of orbitals. The type of hybridisation gives the characteristic shape of the molecule or ion.

i. Why all the orbitals in a set of hybridised orbitals have the same shape and energy?

ii. Out of XeF_2 and SF_2 which molecule has the same shape as NO_2^+ ion?

iii. Out of XeF_4 and XeF_2 which molecule doesn't have the same type of hybridisation as P(Phosphorus) has in PF_5?

iv. Define Octet rule. Write its significance.

Section 'E' __ 5 marks

31. (i) Write the electronic configuration of the following ions : (a) Cu+ (b) Fe2+
(ii) Calculate the total number of electrons present in one mole of methane.
(iii) Find (a) the total number and (b) the total mass of neutrons in 7 mg of 14C. (mass of a neutron = 1.675 × 10-27kg).
(iv) Find (a) the total number and (b) the total mass of protons in 34 mg of NH3 at STP.

32. (i) The density of 1 M solution of HCl is 1.0585 g/mL. The molality of the solution is------
(ii) What will be the uncertainty in the position of an electron (mass = 9.10–31 kg) moving at 300 ms–1 with an accuracy of 0.001 percent?
(iii) A tank is charged with a mixture of 1.0 x 10^3 mol of oxygen and 4.5 x 10^3 mol of helium. Calculate the mole fraction of each gas in the mixture.

33. (i) How many electrons are present in 1.6 g of methane ?
(ii) Write a balanced chemical equation for the following reactions:
Permanganate ion (MnO_4^-) reacts with sulphur dioxide gas in an acidic medium to produce Mn^{2+} and hydrogensulphate ion.
(iii) The density of the 3 molal solution of NaOH is 1.110 g mL–1. Calculate the molarity of the solution.