No.of Printed Pages/Questions:5/33(SET-B)

O.P.JINDAL SCHOOL,SAVITRINAGAR

HALF YEARLY EXAMINATION-(2024-25)

CLASS-XI **MAX.MARKS-70**

SUBJECT-CHEMISTRY **MAX.TIME-3HOURS**

General Instruction:-

(i)All questions are compulsory .There are 33 questions in all.
(ii)SECTION –A: Question numbers 1 to 16 are MCQs carrying one mark each.
(iii) SECTION –B:Question numbers 17 to 21 are short answer type-I questions and carrying 2 marks each.
(iv) SECTION –C: Question numbers 22 to 28 are short answer type-II questions and carrying 3 marks each.
(v) SECTION –D:Question numbers 29 and 30 are case-based questions carrying 4 marks each.
(v) SECTION –E:Question numbers 31 to 33 are al long answer type questions and carrying 5 marks each.
(vi)There is no overall choice. However,an internal choice has been provided in some questions.
(vii)Use of calculator is not permitted. However, you may use log tables, if necessary.

SECTION-A

1.The correct order of electronegativities of N,O,F and P is:

(a)F > N > P > O (b)F > O > P > N
(c)F > O > N > P (d)N > O >F > P

2. Azimuthal quantum number for the last electron in Na atom is:

(a)1 (b)0
(c)2 (d)3

3.2g of oxygen contain number of atoms equal to that contained by :

(a)0.5 g of hydrogen (b)4 g of sulphur
(c)7g of nitrogen (d)2.3 g of sodium

4. Neutrons are present in all atoms except:

(a)He (b)C
(c)H (d)Ne

5.Which of the following has maximum number of atoms?

(a)18g of water (b)16g of O_2
(c)4.4g of CO_2 (d)16g of CH_4

6. The empirical formula of glucose is:

(a)CH_2O (b)CHO

(c)$C_{12}H_{22}O_{11}$ (d)$C(H_2O)_2$

7. Identify the T-shaped molecule in the following :

(a)BF_3 (b)NH_3

(c)NF_3 (d)ClF_3

8. The number of water molecules is maximum in:

(a)18 gram water (b)18 moles water

(c)18 molecules of water (d)1.8 gram of water

9. Which of the following hydrogen bonds is the strongest?

(a)F—H----F (b)O—H----F

(c)O—H---O (d)O—H---N

10. The correct ground state electronic configuration of chromium atom is:

(a)$[Ar]3d^5 4s^1$ (b)$[Ar]3d^4 4s^2$

(c)$[Ar]3d^6 4s^0$ (d)$[Ar]4s^1 4p^5$

12. The element with atomic number 36 belongs to :

(a)s-block (b)p-block

(c)d-block (d)f-block

12. The hybridization of C in ethane,ethene and ethyne is in the order:

(a)sp ,sp^2,sp^3 (b)sp^2,sp^3,sp

(c)sp^3,sp,sp^2 (d)sp^3,sp^2.sp

Questions 13-16 are Assertion and Reason questions:

In these questions(13-16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices:

(a)Assertion and reason both are correct statements and reason is the correct explanation for assertion.

(b) Assertion and reason both are correct statements and reason is not the correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement .

(d) Assertion is wrong statement but reason is correct statement

13. **Assertion:** Boron has smaller first ionization enthalpy than beryllium.
Reason: The penetration of a 2s electron to the nucleus is more than 2p electron hence 2p electron is more shielded by inner core of the electrons than 2s electrons.

14. **Assertion:**Bond angle of H_2O is less than that in H_2S.
Reason: Electronegativity of O is more than that of S.

15.**Assertion:**The empirical mass of ethene is half of its molecular mass.
Reason: The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

16. **Assertion:**It is imposible to determine the exact position and momentum of an electron simultaneously.
Reason: The path of an electron is clearly defined.

SECTION-B

17. Calculate the mass of sugar and water in 30% by mass of 350g solution.

OR

What will be the mass of one ^{12}C atom in gram.

18.What is the total number of sigma and pi bonds in the following : (i)C_2H_2 (ii)C_2H_4

19. Write the electronic configuration of Cu.Why is it different from the expected configuration?

20. Out of O and S , which has higher negative electron gain enthalpy and why?

OR

Arrange the following in increasing order of melting point and give reason.
NaCl ,NaF ,NaI , NaBr

21. Consider the following species: N^{3-} ,Al^{3+} ,F^- ,Mg^{2+} ,O^{2-},Na^+
(i) What is common in them ?
(ii) Arrange them in the increasing ionic radii.

SECTION-C

22. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?

23. **(i)**For an electron in any of 3d orbitals; what are the values of n,l,m_l and m_s .
(ii) Explain giving reason,which of the following sets of quantum numbers are not possible:
(a)n=1, l=1, m_l= 0 ,m_s + ½ (b) n=0, l=2, m_l= -2 ,m_s - ½

24.Explain the Lewis structure of nitrite ion.

25.The density of 3M NaCl solution is 1.25 g mL^{-1}.Calculate the molality of the solution.

26.(i) Out of sigma bond and pi bond ,which is stronger and why?

(ii) Arrange H_2O ,CH_4 and NH_3 in the decreasing order of bond angle.

27. A 25 watt bulb emits monochromatic yellow light of wave length 600 nm.Calculate the number of photons emitted per second.

OR

Yellow light emitted from a sodium lamp has a wave length of 600 nm.Calculate the wave number and frequency of this light..

28.(i) What would be the IUPAC name and symbol of the element with atomic number 109.

(ii) Write the symbol, group number,period number and block of the element with atomic number 120.

SECTION-D

29. Orbitals are region or space where there is maximum probability of finding electrons. Qualitatively,these orbitals can be distinguished by their size,shape and orientation.An orbital of small size means there is more chance of finding electrons near the nucleus.Shape and orientation means the direction in which probability of finding electron is maximum.Atomic orbital can be distinguished by Quantum numbers.Each orbital is designated by three quantum numbers n,l and m_l ,which define energy,shape and orientation but these are not sufficient to explain spectra of multi-electrons atoms. Spin quantum number determines the spin of the electron.Spin angular momentum of electron has two orientations relative to chosen axis which are distinguished by spin quantum numbers m_s , which can take values +1/2 and – ½ .

(i) What represents (a) n=2 , l=1 (b)n=4,l=0 .

(ii) How many electrons can 3p orbital have?

(iii) How many orbitals in 3^{rd} shell are present.

OR

(iii) Write the electronic configuration of (a) Fe^{3+} (b)P

30.Concentrations of solution can be expressed in terms of mass percentage,volume percentage, mass/ volume percentage.Molarity,molality and molefractions are used to express the concentration of solution.Molality can be converted into molarity and vice-versa if density of solution is given. Mole fraction of solute can be converted into molality and vice-versa if we know the molar mass of the solvent.

(i) Define molality.

(ii) What is the unit of moarity.

(iii)A sample of $NaNO_3$ weighing 0.38g is placed in 250 mL volumetric flask.The flask is then filled with water to the mark on the neck.What is the molarity of the solution?

OR

(iii) What is mole fraction of a solute in 2.5 m aqueous solution?

SECTION-E

31.(i) 1.41 g of glucose is dissolved in 30 g of water.Calculate the (a)molality and (b) mole fraction of glucose and water.

(ii) Calculate the mass of an atom of silver(atomic mass of Ag=108)

OR

(i)A compound contains 4.07% hydrogen,24.27% carbon and 71.65% chlorine.Its molecular mass is 98.96.What are its empirical and molecular formula?

(ii) Calculate the number of oxygen atoms present in 5.3 g of sodium carbonate

32. (i) Compare the relative stability of the following species and indicate their magnetic properties: N_2 ,N_2^+ ,N_2^- ,N_2^{2-}

(ii) Why o-nitrophenol is steam volatile where as p-nitrophenol is not steam volatile.

OR

(i) Draw the shape of following molecules on the basis of VSEPR theory:

(a)SF_4 (b)XeF_4 (c)H_2O

(ii) Although CO_2 and H_2O are triatomic molecules,the shape of H_2O molecule is bent while that of CO_2 is linear.Explain on the basis of dipole moment.

33.(i) Calculate the wavelength of an electron moving with a velocity of 2.05×10^7 ms^{-1} .

(ii) Energy of an electron in H atom in ground state is 13.6 eV.What is the value in first excited state.

(iii) Which transitions between Bohr orbits correspond to:

(a)second line in the Balmer series (b) first line in the Brackett series of the hydrogen spectrum ?

OR

(i) Calculate the wave number for the shortest wavelength transition in the Balmer series.

(ii)A golf ball has a mass of 40 g and speed of 45 m/s.If the speed can be measured with accuracy of 2%,calculate the uncertainty in position.

(iii) An atom of an element contains 29 electrons and 35 neutrons.Deduce

(a)the number of paired electrons (b)the number of unpaired electrons

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