

NORTH-EX PUBLIC SCHOOL
(Senior Secondary, Affiliated To CBSE)
School Block, Jain Nagar, Sector-38, Rohini, Delhi – 81
HALF YEARLY EXAMINATION, 2023-24
SUBJECT – CHEMISTRY
CLASS - XI

TIME: 3 hrs.

MM: 70

General Instructions:

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

Section A

1. What is 1molal solution?
2. How has chemistry contributed towards nation's development?
3. What is the value of one mole?
4. The substance which gets used up in any reaction is called -----
5. Why is energy of 1s electron lower than 2s electron?
6. What is the meaning of quantization of energy?
7. Which orbital is non – directional?
8. Give the de – Broglie's relation.
9. Arrange the following elements in the increasing order of metallic character: Si, Be, Mg, Na, P.
10. Why do Na and K have similar properties?
11. What is the general outer electronic configuration of f – block elements?
12. Define a neutral oxide
13. What type of bond is formed when atoms have high difference of electronegativity?
14. Why is dipole moment of CO₂, BF₃, CCl₄ is zero?
15. How many s - and π - bonds are there in a molecule of CH₂ = CH – CH = CH₂ ?
16. What type of bond are formed due to orbital overlap?

Section B

17. Write the significance of octet rule.
18. What changes are observed in atoms undergoing ionic bonding?
19. Name the two elements whose existence and properties were predicted by Mendeleev though they did not exist then.
20. Give the main features of s-block elements.

21. Which experiment led to the discovery of electrons and how?

Section C

22. How many significant figures are present in

(a) 4.01×10^2

(b) 8.256

(c) 100

23. Vitamin C is essential for the prevention of scurvy. Combustion of 0.2000g of vitamin C gives 0.2998g of CO_2 and 0.819g of H_2O . What is the empirical formula of vitamin C?

24. What designations are given to the orbitals having

(i) $n = 2, l = 1$ (ii) $n = 2, l = 0$ (iii) $n = 4, l = 3$

(iv) $n = 4, l = 2$ (v) $n = 4, l = 1$?

25. Write the electronic configuration of (i) Mn^{4+} , (ii) Fe^{3+} (iii) Cr^{2+} and Zn^{2+} . Mention the number of unpaired electrons in each case.

26. Give the main features of d and f-block elements.

27. Explain why cations are smaller and anions are larger in radii than their parent atom?

28. Mention the factors that influence the formation of an ionic bond.

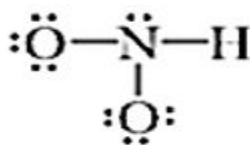
Section D

29. Question No. 1 to 4 are based on the given text. Read the text carefully and answer the questions:

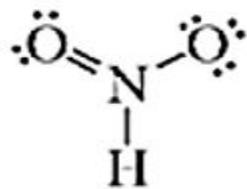
The Lewis dot structures provide a picture of bonding in molecules and ions in terms of the shared pairs of electrons and the octet rule. While such a picture may not explain the bonding and behaviour of a molecule completely, it does help in understanding the formation and properties of a molecule to a large extent. The total number of electrons required for writing the structures is obtained by adding the valence electrons of the combining atoms. In general, the least electronegative atom occupies the central position in the molecule/ion. After accounting for the shared pairs of electrons for single bonds, the remaining electron pairs are either utilized for multiple bonding or remain as the lone pairs. The basic requirement being that each bonded atom gets an octet of electrons. Lewis dot structures, in general, do not represent the actual shapes of the molecules. In the case of polyatomic ions, the net charge is possessed by the ion as a whole and not by a particular atom. It is, however, feasible to know the chemical symbols of the combining atoms and having knowledge of the skeletal structure of the compound (known or guessed intelligently).

1. In NF_3 and CO_3^{2-} the position occupied by the central atom is.

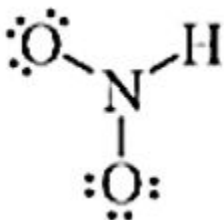
2. Which of the following is the Lewis dot structure of HNO_3 .



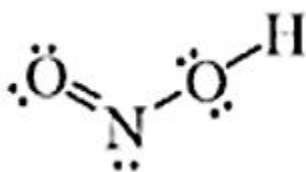
i)



ii)



iii)



iv)

3. Which of the following has zero dipole moment?

- v) SiF_4
- vi) PCl_3
- vii) Cl_3CF
- viii) ClF

4. Which of the following steps not involve in the formation of the lewis structure of nitrate ion.

- ix) Then draw a single bond between the N_2 and each of the O_2 atoms completing an octet of O_2 atoms.
- x) Then complete the octet of one oxygen.
- xi) Then write the skeletal structure of NO_2 .
- xii) Count the total number of valence electrons of the N_2 atom.

30. Question No. 1 to 5 are based on the given text. Read the text carefully and answer the questions:

In the modern periodic table, elements are arranged in order of increasing atomic numbers which is related to the electronic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, s, p, d, and f. The modern periodic table consists of 7 periods and 18 groups. Each period begins with the filling of a new energy shell. In accordance with the Aufbau principle, the seven periods (1 to 7) have 2, 8, 8, 18, 18, 32 and 32 elements respectively. The seventh period is still incomplete. To avoid the periodic table being too long, the two series of f-block elements, called lanthanoids and actinoids are placed at the bottom of the main body of the periodic table.

- Which of the following sequences contain atomic numbers of only representative elements?
 - 3, 33, 53, 87
 - 2, 10, 22, 36
 - 7, 17, 25, 37, 48
 - 9, 35, 51, 88
 - I and II
 - I and III
 - I and IV
 - III and IV
- The last element of the p-block in the 6th period is represented by the outermost electronic configuration.
 - $5f^{14}6d^{10}7s^27p^0$
 - $4f^{14}5d^{10}6s^26p^4$
 - $4f^{14}5d^{10}6s^26p^6$
 - $7s^27p^6$

Which of the elements whose atomic numbers are given below, cannot be accommodated in the present set up of the long form of the periodic table?

- 109
- 118
- 126
- 102

The elements with atomic numbers 35, 53 and 85 are all _____.

- halogens
- noble gases
- heavy metals
- light metals

31. Discuss the factors affecting electron gain enthalpy and the trend in its variation in the periodic table.

32. The first (IE) and second (IER) ionization enthalpy: (KJ mol^{-1}) of three elements A, B and C are given below:

	A	B	C
IE ₁	403	549	1142
IE ₂	2640	1060	2080

Identify the element which is likely to be

- a non-metal
- an alkali metal
- an alkaline earth metal

33. a) What factors affect the formation of the ionic bond. Explain with examples.

b) Arrange the following in increasing order of ionic character and also give the reason. NaCl, CaCl₂, MgCl₂, MgO.

