

HALF YEARLY EXAMINATION (2021-22)

CLASS XI  
CHEMISTRY

TIME: 90 MINUTES

MAX.MARKS: 35

General Instructions:

1. The Question Paper contains three sections.
2. Section A has 25 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 6 questions. Attempt any 5 questions.
5. All questions carry equal marks.
6. There is no negative marking.

**SECTION A**

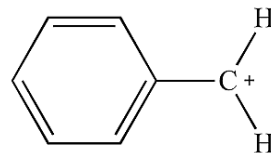
This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions is attempted, ONLY first 20 will be considered for evaluation.

- 1 d-shell containing four unpaired electrons can exchange
  - A) four electrons
  - B) three electrons
  - C) sixteen electrons
  - D) six electrons
- 2 The element with highest second ionization energy is
  - A) Cl
  - B) S
  - C) Na
  - D) Mg
- 3 Which of the following pair of ions have same paramagnetic moment?
  - A)  $\text{Cu}^{+2}$ ,  $\text{Ti}^{+3}$
  - B)  $\text{Mn}^{+2}$ ,  $\text{Cu}^{+2}$
  - C)  $\text{Ti}^{+4}$ ,  $\text{Cu}^{+2}$
  - D)  $\text{Ti}^{+3}$ ,  $\text{Ni}^{+2}$
- 4 The frequency of a wave of light is  $12 \times 10^{14} \text{s}^{-1}$ . The wave number associated with this light
  - A)  $5 \times 10^{-7} \text{ m}$
  - B)  $4 \times 10^{-8} \text{ cm}^{-1}$
  - C)  $2 \times 10^{-7} \text{ m}^{-1}$
  - D)  $4 \times 10^4 \text{ cm}^{-1}$
- 5 The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizing order of the polarizing power of the cationic species,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Be}^{2+}$  ?
  - A)  $\text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^+ < \text{K}^+$
  - B)  $\text{Mg}^{2+} < \text{Be}^{2+} < \text{K}^+ < \text{Ca}^{2+}$
  - C)  $\text{Be}^{2+} < \text{K}^+ < \text{Ca}^{2+} < \text{Mg}^{2+}$
  - D)  $\text{K}^+ < \text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+}$
- 6 In a hydrogen atom, if energy of an electron in ground state is 13.6 eV, then that in the 2<sup>nd</sup> excited state is
  - A) 1.51 eV
  - B) 3.4 eV
  - C) 6.04 eV
  - D) 13.6 eV
- 7 According to Aufbau's principle, which of the three 4d, 5p and 5s will be filled with electrons first
  - A) 4d
  - B) 5p
  - C) 5s
  - D) 4d and 5s will be filled simultaneously
- 8 Which of the following sets of quantum numbers represents the highest energy of an atom?
  - A)  $n = 3, l = 0, m = 0, s = +1/2$
  - B)  $n = 3, l = 1, m = 1, s = +1/2$
  - C)  $n = 3, l = 2, m = 1, s = +1/2$
  - D)  $n = 4, l = 0, m = 0, s = +1/2$

- 9 The ions  $O^{2-}$ ,  $F^-$ ,  $Na^+$ ,  $Mg^{2+}$  and  $Al^{3+}$  are isoelectronic. Their ionic radii show  
 A) a significant increase from  $O^{2-}$  to  $Al^{3+}$   
 B) a significant decrease from  $O^{2-}$  to  $Al^{3+}$   
 C) an increase from  $O^{2-}$  to  $F^-$  and then decrease from  $Na^+$  to  $Al^{3+}$   
 D) a decrease from  $O^{2-}$  to  $F^-$  and then increase from  $Na^+$  to  $Al^{3+}$ .
- 10 Which has maximum molecules?  
 A) 7 g  $N_2$   
 B) 2 g  $H_2$   
 C) 16 g  $NO_2$   
 D) 16 g  $O_2$
- 11 The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is  
 A) 40                      B) 10                      C) 20                      D) 30
- 12 A compound contains atoms A, B and C; the oxidation number of A is +2, that of B is +5 and that of C is -2. A possible formula of the compound is  
 A)  $ABC_2$   
 B)  $A_2(BC_3)_2$   
 C)  $A_3(BC_4)_2$   
 D)  $A_3(B_4C)_2$
- 13 Which of the following is electron-deficient?  
 A)  $(BH_3)_2$   
 B)  $PH_3$   
 C)  $(CH_3)_2$   
 D)  $(SiH_3)_2$
- 14 Two electrons occupying the same orbital are distinguished by  
 A) azimuthal quantum number  
 B) spin quantum number  
 C) principal quantum number  
 D) magnetic quantum number
- 15 The correct order regarding the electronegativity of hybrid orbitals of carbon is  
 A)  $sp < sp^2 < sp^3$   
 B)  $sp > sp^2 < sp^3$   
 C)  $sp > sp^2 > sp^3$   
 D)  $sp < sp^2 > sp^3$
- 16 The number of hydrogen bonded water molecule(s) associated with  $CuSO_4 \cdot 5H_2O$  is  
 A) 3                      B) 1                      C) 2                      D) 5
- 17 With which of the following electronic configuration an atom has the lowest ionisation enthalpy?  
 A)  $1s^2 2s^2 2p^3$   
 B)  $1s^2 2s^2 2p^5 3s^1$   
 C)  $1s^2 2s^2 2p^6$   
 D)  $1s^2 2s^2 2p^5$
- 18 Match the oxide given in column I with its property given in column II.

Column I	Column II
(i) $Na_2O$	p. Neutral
(ii) $Al_2O_3$	q. Basic
(iii) $N_2O$	r. Acidic
(iv) $Cl_2O_7$	s. Amphoteric

- Which of the following options has all correct pairs?
- A) (i)-q, (ii)-p, (iii)-s, (iv)-r  
 B) (i)-r, (ii)-q, (iii)-p, (iv)-s  
 C) (i)-p, (ii)-s, (iii)-q, (iv)-r  
 D) (i)-q, (ii)-s, (iii)-p, (iv)-r
- 19 The IUPAC name of  $(\text{CH}_3)_2\text{CH} - \text{CH}_2 - \text{CH}_2\text{Br}$  is  
 A) 1-bromo-3-methylbutane  
 B) 2-methyl-3-bromopropane  
 C) 1-bromopentane  
 D) 2-methyl-4-bromobutane
- 20 What is the hybridisation state of benzyl carbonium ion?  
 A)  $\text{sp}^2$   
 B)  $\text{sp}^{\text{d}2}$   
 C)  $\text{sp}^{\text{d}}$   
 D)  $\text{sp}^3$
- 21 How many chain isomers could be obtained from the alkane  $\text{C}_6\text{H}_{14}$ ?  
 A) Four  
 B) Five  
 C) Six  
 D) Seven
- 22 IUPAC name of the following is  
 $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} \equiv \text{CH}$   
 A) 1,5-hexenyne  
 B) 1-hexene-5-yne  
 C) 1-hexyne-5-ene  
 D) 1,5-hexynene.
- 23 . What is the change in oxidation number of carbon in the following reaction?  
 $\text{CH}_4(\text{g}) + 4\text{Cl}_2(\text{g}) \rightarrow \text{CCl}_4(\text{l}) + 4\text{HCl}(\text{g})$   
 A) + 4 to + 4  
 B) 0 to + 4  
 C) - 4 to + 4  
 D) 0 to - 4
- 24 An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gave C- 38.71% and H- 9.67%. The empirical formula of the compound would be  
 A) CHO  
 B)  $\text{CH}_4\text{O}$   
 C)  $\text{CH}_3\text{O}$   
 D)  $\text{CH}_2\text{O}$
- 25 The percentage of Na is  $\text{Na}_2\text{SO}_4$  in  
 A) 32.3%  
 B) 30%  
 C) 40%  
 D) 50%

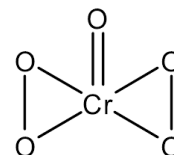


### SECTION B

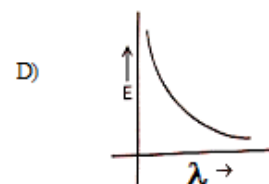
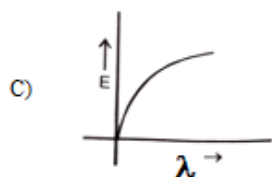
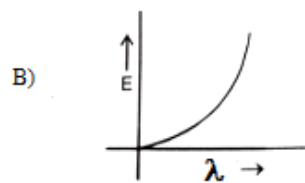
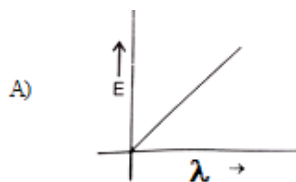
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- 26 Which of the following structures will have a bond angle of  $120^\circ$  around the central atom?  
 A) Linear  
 B) Tetrahedral  
 C) Triangular  
 D) Square planar
- 27 In which of the following substances, the intermolecular forces are hydrogen bonds?  
 A) Hydrogen Chloride  
 B) Hydrogen Sulphide  
 C) Dry Ice  
 D) Ice

- 28 Which one of the following pairs of species have the same bond order?  
 A)  $\text{CN}^-$  and  $\text{NO}^+$   
 B)  $\text{CN}^-$  and  $\text{CN}^+$   
 C)  $\text{O}_2^-$  and  $\text{CN}^-$   
 D)  $\text{NO}^+$  and  $\text{CN}^+$
- 29 Which of the following is a redox reaction?  
 A)  $\text{NaCl} + \text{KNO}_3 \rightarrow \text{NaNO}_3 + \text{KCl}$   
 B)  $\text{Mg}(\text{OH})_2 + 2\text{NH}_4\text{Cl} \rightarrow \text{MgCl}_2 + 2\text{NH}_4\text{OH}$   
 C)  $\text{CaC}_2\text{O}_4 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{C}_2\text{O}_4$   
 D)  $2\text{Zn} + 2\text{AgCN} \rightarrow 2\text{Ag} + \text{Zn}(\text{CN})_2$
- 30  $\text{CrO}_5$  has structure as shown, The oxidation number of chromium in the compound is?  
 A) +10  
 B) +6  
 C) +4  
 D) +5



- 31 The oxidation process involves  
 A) Increase in oxidation number  
 B) Decrease in oxidation number  
 C) No change in oxidation number  
 D) none of the above
- 32 Right order of dissociation energy of  $\text{N}_2$  and  $\text{N}_2^+$  is  
 A)  $\text{N}_2 > \text{N}_2^+$   
 B)  $\text{N}_2 = \text{N}_2^+$   
 C)  $\text{N}_2^+ > \text{N}_2$   
 D) none.
- 33 The maximum density of water at  $4^\circ\text{C}$  is :  
 A)  $1.0 \text{ g / cm}^3$   
 B)  $0.998 \text{ g / cm}^3$   
 C)  $0.918 \text{ g / cm}^3$   
 D)  $1.2 \text{ g / dm}^3$
- 34 20g of an ideal gas contains only S and O occupies 5.6L at 1atm and 273 K. What is the molecular weight of the gas?  
 A) 64  
 B) 90  
 C) 80  
 D) None of these
- 35 . Rearrange the following( I to V) in increasing order of masses  
 (I) 0.5 mole of  $\text{O}_3$   
 (II) 0.5 gram atom of oxygen  
 (III)  $3.011 \times 10^{23}$  molecules of oxygen  
 (IV) 5.6 L of  $\text{CO}_2$  at STP  
 A) II < IV < III < I  
 B) II < I < IV < III  
 C) IV < II < III < I  
 D) I < II < III < IV
- 36 Which one of the following is the correct graph between energy and wavelength for a given photon?

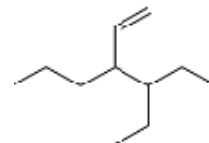


- 37 Photoelectric emission starts at the surface only when the light incident on the surface has certain minimum
- Wavelength
  - Intensity
  - Frequency
  - Velocity

- 38 In set of degenerate orbitals the electrons distribute themselves to retain similar spin as far as possible. This statement is attribute to
- Aufbau Principle
  - Hund's Rule
  - Pauli Exclusion Principle
  - Slate's rule

- 39 The correct IUPAC name for the compound is

- 4-ethyl-3-propylhex-1-ene
- 3-ethyl-4-ethenylheptane
- 3-ethyl-4-propylhex-5-ene
- 3-(1-ethylpropyl)hex-1-ene.



- 40 Which one of the following pairs represents stereoisomerism?
- Structural isomerism and geometrical isomerism
  - Optical isomerism and geometrical isomerism
  - Chain isomerism and rotational isomerism
  - Linkage isomerism and geometrical isomerism

- 41 The number of sigma ( $\sigma$ ) and pi ( $\pi$ ) bonds in pent-2-en-4-yne is
- 13  $\sigma$  bonds and no  $\pi$  bond
  - 10  $\sigma$  bonds and 3  $\pi$  bonds
  - 8  $\sigma$  bonds and 5  $\pi$  bonds
  - 11  $\sigma$  bonds and 2  $\pi$  bonds.

- 42 In the periodic table, with the increase in atomic number, the metallic character of an element
- decreases in a period and increases in a group
  - increases in a period and decreases in a group
  - increases both in a period and the group
  - decreases in a period and the group.

- 43 Match the following

Column I	Column II
a. Synthesis gas	p. reducing agent
b. Calgon	q. Mixture of CO and H <sub>2</sub>
c. Heavy water	r. Softening of water
d. Dhydrogen	s. Prolonged electrolysis of water

- a-s, b-r, c-p, d-q
- a-q, b-r, c-s, d-p
- a-q, b-r, c-p, d-s
- a-p, b-q, c-r, d-s

- 44 **Assertion :** BF<sub>3</sub> molecule has zero dipole moment.

**Reason :** F is electronegative and B–F bonds are polar in nature.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

45 **Assertion :** Atomic number of the element ununbium is 112.

**Reason :** Name for digits 1 and 2 is un- and bi-respectively in latin words.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

46 **Assertion:** Significant figures for 0.200 is 3 whereas for 200 it is 1.

**Reason :** Zero at the end or right of a number are significant provided they are not on the right side of the decimal point.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

47 **Assertion:** 1-Pentene and 2-Pentene are functional isomers

**Reason:** Functional isomers have same molecular formula.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

48 **Assertion:**  $\text{CaCl}_2$  will have greater covalent character than  $\text{AlCl}_3$ .

**Reason:** The greater the charge on the cation, the greater is the covalent character of the ionic bond.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

49 **Assertion:** It is impossible to determine the exact position and exact momentum of an electron simultaneously.

**Reason:** The path of an electron in an atom is clearly defined.

- (A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
- (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
- (C) Assertion is correct, but reason is wrong statement.
- (D) Assertion is wrong, but reason is correct statement.

### SECTION C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation

50 The electron present in 5<sup>th</sup> orbit in excited hydrogen atom returned back to ground state. The number of lines appears in Lyman series of Hydrogen spectra are

- A) 2
- B) 1
- C) 3
- D) 4

- 51  $\text{CH}_3\text{CH}_2\text{Cl}$  undergoes homolytic fission to produce
- A)  $\text{CH}_3\text{CH}_2\cdot$  &  $\text{Cl}^\cdot$
  - B)  $\text{CH}_3\text{CH}^{+2}$  &  $\text{Cl}^-$
  - C)  $\text{CH}_3\text{CH}^{+1}$  &  $\text{Cl}^-$
  - D)  $\text{CH}_3\text{CH}_2\cdot$  &  $\text{Cl}^-$
- 52 In which of the following molecules octet rule is not followed?
- A)  $\text{NH}_3$
  - B)  $\text{CH}_4$
  - C)  $\text{CO}_2$
  - D)  $\text{NO}$

**Read the passage given below and answer the following questions:**

Concentrations of solution can be expressed in terms of mass percentage, volume percentage, mass/ volume percentage. Molarity, molality and mole fractions are also used to express 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 molar mass of solvent

- 53 Molality is defined as number of moles of solute per
- A) kg of solution
  - B) kg of solvent
  - C) Litre of solution
  - D) Litre of solvent
- 54 Whenever gases combine, they do so in volume and bear a simple ratio among themselves and to the products if these are gaseous at same temperature and pressure is known as
- A) Boyle's law
  - B) Charle's law
  - C) Avogadro's law
  - D) Gay lussac's law of combining volume
- 55 The unit of molarity is
- A)  $\text{mol L}^{-1}$
  - B)  $\text{mol/kg}$
  - C) no unit
  - D)  $\text{g/litre}$