



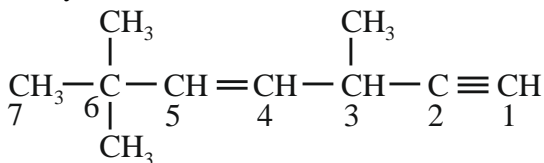
CHEMISTRY

SECTION-A

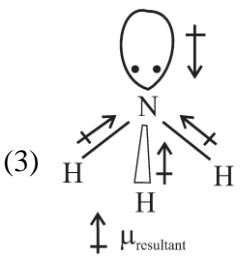
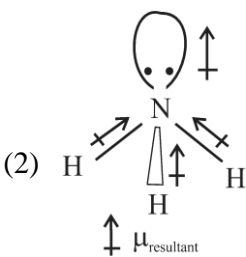
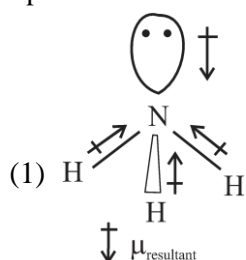
1. A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). What is the molar ratio of two gases in the mixture?
(1) 1 : 2 (2) 4 : 1
(3) 2 : 2 (4) 2 : 3
2. The maximum number of molecules is present in;
(1) 5 g of O_2 gas
(2) 1.5 g of H_2 gas
(3) 5 L of N_2 gas at STP
(4) 15 L of H_2 gas at STP
3. The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase?
(1) $K^+ < Ar < Ca^{2+}$ (2) $Ar < K^+ < Ca^{2+}$
(3) $Ca^{2+} < Ar < K^+$ (4) $Ca^{2+} < K^+ < Ar$
4. An amount of 0.3 mole of $SrCl_2$ is mixed with 0.2 mole of K_3PO_4 . The maximum moles of KCl which may form is;
(1) 0.6 (2) 0.5
(3) 0.3 (4) 0.1
5. The electronic configuration of the element with highest electron affinity is;
(1) $3s^2 3p^5$ (2) $2s^2 2p^3$
(3) $2s^2 2p^5$ (4) $2s^2 2p^2$
6. Which of the following has the biggest radius?
(1) Cs^+ (2) Mg^{2+}
(3) Na^+ (4) Li^+
7. Bohr's radius for the H-atom ($n = 1$) is approximately 0.53 Å. The radius of the first excited state ($n = 2$) orbit is;
(1) 0.13 Å (2) 106 Å
(3) 4.77 Å (4) 2.12 Å
8. The number of radial nodes, nodal planes for an orbital with $n = 4$; $l = 1$ is;
(1) 3, 1 (2) 2, 1
(3) 2, 0 (4) 4, 0
9. 26.8 gm of $Na_2SO_4 \cdot nH_2O$ contains 12.6 g of water. The value of n is;
(1) 1 (2) 10
(3) 6 (4) 7
10. Which of the following species has a linear shape?
(1) NO_2^- (2) SO_2
(3) NO_2^+ (4) O_3
11. In a periodic table, the basic character of oxides:
(1) increases from left to right and decreases from top to bottom.
(2) decreases from right to left and increases from top to bottom.
(3) decreases from left to right and increases from top to bottom.
(4) decreases from left to right and increases from bottom to top.
12. Thermodynamically, most stable form of carbon is;
(1) diamond (2) graphite
(3) peat (4) coal
13. The linear structure is assumed by;
(1) $SnCl_2$
(2) NCO^-
(3) CS_2
(4) Both (2) and (3)
14. Amongst NaCl, $MgCl_2$, $AlCl_3$, in which compound the percentage ionic character in the bonds is lowest?
(1) $AlCl_3$ (2) $MgCl_2$
(3) NaCl (4) Both (2) and (3)
15. Which of the following compounds has the maximum s-character in its central atom?
(1) CH_4
(2) XeO_3
(3) BCl_3
(4) NO_2^+



16. The state of hybridization of C₂, C₃, C₅ and C₆ of the hydrocarbon.



- (1) sp, sp², sp³ and sp²
 (2) sp, sp³, sp² and sp³
 (3) sp³, sp², sp² and sp
 (4) sp, sp², sp² and sp³
17. Which of the following is **correct** representation of dipole moment of NH₃ molecule?



- (4) NH₃ being symmetrical will not show dipole moment

18. Which of the following represents the **correct** order of increasing electron gain enthalpy with negative sign for the elements O, S, F and Cl?
- (1) Cl < F < O < S (2) O < S < F < Cl
 (3) F < S < O < Cl (4) S < O < Cl < F

19. The difference between heats of reaction at constant pressure and constant volume of the following reaction would be;
- $$2\text{C}_6\text{H}_6(\text{l}) + 15\text{O}_2(\text{g}) \rightarrow 12\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l}) \text{ at } 25^\circ\text{C in kJ is;}$$
- (1) -7.43 (2) +3.72
 (3) -3.72 (4) +7.43

20. The ΔH_f° for CO₂(g), CO(g) and H₂O(g) are -393.5, -110.5 and -241.8 kJ mol⁻¹ respectively. The standard enthalpy change in kJ for the reaction, CO₂(g) + H₂(g) → CO(g) + H₂O(g) is;
- (1) +524.1 (2) +41.2
 (3) -262.5 (4) -41.2

21. Using $G_f^\circ(\text{HI}) = 1.3 \text{ kJ/mole}$, calculate the standard free energy change for the following reaction,
- $$\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightarrow 2\text{HI}(\text{g});$$
- (1) 2.6 kJ/mol (2) 3.0 kJ/mol
 (3) 4.0 kJ/mol (4) 1.3 kJ/mol

22. Match the following, regarding nature of the oxides

List-I		List-II	
(A)	H ₂ O	(I)	Basic
(B)	Na ₂ O	(II)	Amphoteric
(C)	ZnO	(III)	Acidic
(D)	SO ₃	(IV)	Neutral

- (1) A → (II), B → (I), C → (III), D → (IV)
 (2) A → (IV), B → (I), C → (III), D → (II)
 (3) A → (IV), B → (I), C → (II), D → (III)
 (4) A → (II), B → (I), C → (IV), D → (III)

23. **Statement-I:** Bond angle of BF₃ and NF₃ are different.

Statement-II: BF₃ and NF₃ are having different shape.

- (1) Statement I and Statement II both are correct.
 (2) Statement I is correct, but Statement II is incorrect.
 (3) Statement I is incorrect, but Statement II is correct.
 (4) Statement I and Statement II both are incorrect.

24. **Statement-I:** He and Be have similar outer shell electronic configuration of type ns².

Statement-II: He and Be are chemically inert.

- (1) Statement I and Statement II both are correct.
 (2) Statement I is correct, but Statement II is incorrect.
 (3) Statement I is incorrect, but Statement II is correct.
 (4) Statement I and Statement II both are incorrect.

25. **Statement I:** p-hydroxy benzoic acid has a lower B.P. than o-hydroxy benzoic acid

Statement II: o-hydroxy benzoic acid has intramolecular H-bonding.

- (1) Statement I and Statement II both are correct.
 (2) Statement I is correct, but Statement II is incorrect.
 (3) Statement I is incorrect, but Statement II is correct.
 (4) Statement I and Statement II both are incorrect.



26. On the addition of mineral acid to an aqueous solution of borax, which of the following compound is formed?

- (1) Boron hydride (2) Orthoboric acid
(3) Metaboric acid (4) Pyroboric acid

27. **Assertion (A):** pH of pure water increases with increase in temperature.

Reason (R): Self ionization of water is an endothermic reaction.

- (1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

28. **Assertion (A):** Group 1 elements are the largest in their horizontal periods in the periodic table (exclude noble gases).

Reason (R): The melting and boiling points of group 1 elements increases on moving down from Li to Cs.

- (1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

29. Glass is soluble in:

- (1) HF (2) H₂SO₄
(3) HClO₄ (4) aqua-regia

30. Which of the following statement is **incorrect**:

- (1) At equilibrium, concentration of reactants must be equal to concentration of products.
(2) Equilibrium can be attained in both homogenous and heterogenous reaction.
(3) Approach to the equilibrium is fast in initial state but gradually it decreases.
(4) Equilibrium is dynamic in nature.

31. The reaction, $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ is started in a five-litre container by taking one mole of PCl_5 . If 0.3 mole of PCl_5 is there at equilibrium, concentration of PCl_3 and K_c will respectively be:

- (1) $0.14, \frac{49}{150}$ (2) $0.12, \frac{23}{100}$
(3) $0.07, \frac{23}{100}$ (4) $20, \frac{49}{150}$

32. The equilibrium constant for the reaction $\text{Br}_2 \rightleftharpoons 2\text{Br}$ at 500 K and 700 K are 1×10^{-10} and 1×10^{-5} respectively. The reaction is;

- (1) Endothermic (2) Exothermic
(3) Fast (4) Slow

33. The compound that can work both as an oxidising as well as a reducing agent is;

- (1) KMnO_4 (2) H_2O_2
(3) HNO_3 (4) $\text{K}_2\text{Cr}_2\text{O}_7$

34. In the ionic equation $2\text{K}^+\text{BrO}_3^- + 12\text{H}^+ + 10\text{e}^- \rightarrow \text{Br}_2 + 6\text{H}_2\text{O} + 2\text{K}^+$, the equivalent weight of KBrO_3 will be:

- (1) $M/5$ (2) $M/2$
(3) $M/6$ (4) $M/4$

35. K_{sp} of AgCl is 1×10^{-10} . Its solubility in 0.1 M KNO_3 will be:

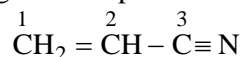
- (1) 10^{-5} mol/litre
(2) $> 10^{-5}$ mol/litre
(3) $< 10^{-5}$ mol/litre
(4) None of these

SECTION-B

36. Internal energy does not include:

- (1) rotational energy.
(2) nuclear energy.
(3) vibrational energy.
(4) energy due to gravitational pull.

37. The correct hybridization states of carbon atoms of the given compound are matched in which option:



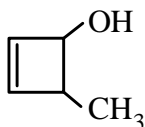
	C ₁	C ₂	C ₃
(1)	sp ²	sp ³	sp ²
(2)	sp ²	sp ³	sp ³
(3)	sp ²	sp ²	sp
(4)	sp ³	sp ³	sp ³

38. The order of reactivity of alkyl halides in Wurtz reaction is ____.

- (1) $\text{R-I} > \text{R-Br} > \text{R-Cl}$
(2) $\text{R-I} < \text{R-Br} < \text{R-Cl}$
(3) $\text{R-Br} > \text{R-I} < \text{R-Cl}$
(4) $\text{R-I} > \text{R-Cl} > \text{R-Br}$

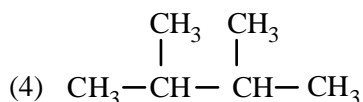


39. The IUPAC name of the below mentioned compound is:-



- (1) 3-methylcyclobut-1-en-2-ol
(2) 4-methylcyclobut-2-en-1-ol
(3) 4-methylcyclobut-1-en-3-ol
(4) 2-methylcyclobut-3-en-1-ol
40. Which one is **not** prepared by Wurtz reaction?

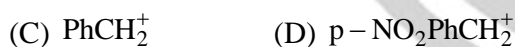
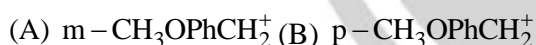
- (1) C_2H_6
(2) $n-C_4H_{10}$
(3) CH_4



41. Elimination reaction of 2-Bromopentane to form Pent-2-ene is;

- (a) β -Elimination reaction
(b) Follow Zaitsev rule
(c) Dehydrohalogenation reaction
(d) Dehydration reaction
(1) (a), (c), (d) (2) (b), (c), (d)
(3) (a), (b), (d) (4) (a), (b), (c)

42. Decreasing order of stability of following carbocations is;

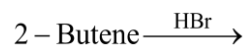


- (1) $A > B > C > D$ (2) $C > B > A > D$
(3) $C > B > A > D$ (4) $B > C > A > D$

43. Be^{2+} is isoelectronic with which of the following ions?

- (1) H^+ (2) Li^+
(3) Na^+ (4) Mg^{2+}

44. The number of Product in given reaction will be:



- (1) 1 (2) 2
(3) 4 (4) 3

45. Halogens in an organic compound can be detected by:

- (1) Duma's method
(2) Carius method
(3) Kjeldahl's method
(4) Chromatography

46. Which is the most acidic among the following?

- (1) methane
(2) acetylene
(3) 1-butene
(4) neo-pentane

47. Pyrolysis of alkanes is a ____.

- (1) nucleophilic addition reaction.
(2) free radical substitution reaction.
(3) electrophilic addition reaction.
(4) free radical elimination reaction.

48. 32 gm of SO_x occupies 11.2 litre at S.T.P. Assuming ideal gas nature, the value of x is;

- (1) 1 (2) 2
(3) 3 (4) 4

49. 1 M NaCl and 1 M HCl are present in an aqueous solution. The solution is

- (1) not a buffer solution with $pH < 7$
(2) not a buffer solution with $pH > 7$
(3) a buffer solution with $pH < 7$
(4) a buffer solution with $pH = 7$

50. HF has highest boiling point among hydrogen halides, because it has:

- (1) lowest ionic character.
(2) lowest dissociation enthalpy.
(3) strongest vander Waals interactions.
(4) strongest hydrogen bonding.

