Sample Paper-02

Class 11th NEET (2024)

CHEMISTRY

ANSWER KEY

1.	(2)	26.	(2)
2.	(2)	27.	(3)
3.	(2)	28.	(4)
4.	(1)	29.	(1)
5.	(1)	30.	(3)
6.	(2)	31.	(2)
7.	(3)	32.	(1)
8.	(2)	33.	(4)
9.	(1)	34.	(4)
10.	(2)	35.	(1)
11.	(1)	36.	(1)
12.	(4)	37.	(4)
13.	(3)	38.	(4)
14.	(2)	39.	(2)
15.	(1)	40.	(4)
16.	(4)	41.	(2)
17.	(2)	42.	(4)
18.	(1)	43.	(3)
19.	(4)	44.	(4)
20.	(1)	45.	(1)
21.	(2)	46.	(4)
22.	(4)	47.	(3)
23.	(4)	48.	(3)
24.	(4)	49.	(3)
25.	(3)	50.	(3)

HINTS AND SOLUTION

1. **(2)**

$3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

$3 \times 56g \quad 4 \times 18g$

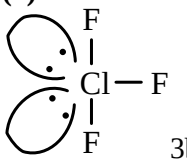
$= 168g \quad = 72g$

72 g steam reacts with 168g of iron

18 g steam will react with 42g of iron

2. **(2)** Acidic Character increases with increase in non-metallic character

3. **(2)**



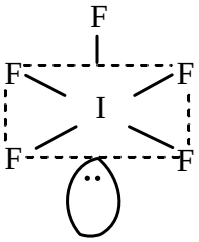
3bp + 2l.p

4. **(1)**

IF_5

$H = \frac{1}{2}[V + M - C + A]$

$= \frac{1}{2}[7 + 5 - 0 + 0] = 6 \Rightarrow sp^3d^2$



According to sp^3d^2 hybridisation, geometry will be octahedral, however according to V.S.E.P.R theory, the compound having 5b.p + 1l.p will show square pyramidal shape.

5. **(1)**

Acc. to de-Broglie, $\lambda = \frac{h}{mv}$

Put $mv = \frac{nh}{2\pi r}$

Now, $n\lambda = 2\pi r$

6. **(2)**

$CaCl_2 + 2AgNO_3 \rightarrow 2AgCl + Ca(NO_3)_2$

$$\text{moles of AgCl} = \frac{4.31}{143.5}$$

$$\therefore \quad \text{mole of } CaCl_2 = \frac{4.31}{143.5} \times \frac{1}{2} = 0.015$$

7. **(3)**

Both O_2^{2-} and F_2 have 18 electrons.

8. **(2)**

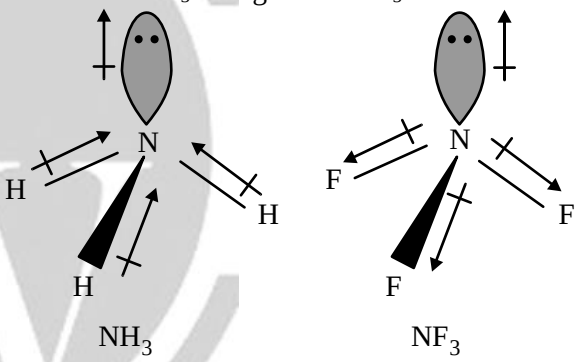
Bond order of $O_2^+(2.5)$ is more than that of $O_2(2.0)$ and is also paramagnetic due to one electron in antibonding molecular orbital.

9. **(1)**

$5 \rightarrow 1$ represents highest energy.

10. **(2)**

The dipole moment of NF_3 is less than NH_3. In NH_3 and NF_3, the central atom nitrogen has three σ bonds and one lone pair. Hence, both are sp^3 hybridized and possess trigonal pyramidal shape. In NH_3 and NF_3, the dipole moment vectors do not cancel out each other. Hence, both the molecules are polar in nature. In NH_3, the dipole moment vector of the bond and the lone pairs are in the same direction. But in NF_3, the dipole moment vector of lone pairs and bond pairs are opposite in direction. So, the net dipole moment will be the substractive effect of the two. Hence, the dipole moment of NH_3 is larger than NF_3.



NH_3 $\qquad$ NF_3

11. **(1)**

Only NO^- have unpaired electron.

12. **(4)**

Equilibrium constant is independent of concentration of reactant or product.

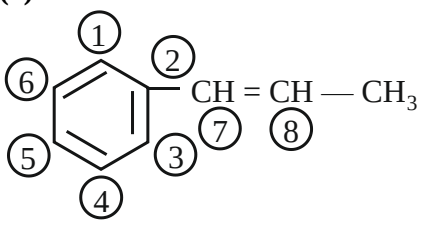
13. **(3)**

$SF_4 \Rightarrow$ 4.b.p + 1 lp $\Rightarrow$ S $\Rightarrow sp^3d$

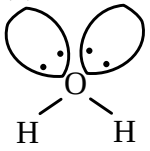
% d character = $\frac{1}{5} \times 100$

= 20%

14. **(2)**



15. **(1)**



16. **(4)**

If bond energy of various bonds present in the reactants and product are given, then ΔH of that reaction can be calculate as follows:

$$\boxed{\Delta H = \Sigma(\text{B.E.})_R - \Sigma(\text{B.E.})_P}$$

17. **(2)**

For burning one mole of methane 880 kJ is evolved.

For $\frac{3.2}{16}$ moles of methane.

Heat evolved = $\frac{880}{5}$ = 176 kJ

176 kJ of heat is absorbed

18. **(1)**

$S(s) + \frac{3}{2}O_2(g) \rightarrow SO_3(g) + x$ kcals ….1

$SO_2(g) + \frac{1}{2}O_2(g) \rightarrow SO_3(g) + y$ kcals …..2

Subtract equation 2 from 1

$S + O_2 \rightarrow SO_2 + (x - y)$k cals

19. **(4)**

For isothermally process $\Delta E = 0$

20. **(1)**

The salt of strong acid and strong base does not undergo hydrolysis. So, only CH_3COONa (strong base+ weak acid) will undergo hydrolysis in water and gives basic solution.

21. **(2)**

The expression for the pH of the acidic buffer solution is as given below.

$$pH = pK_a + \log_{10}\frac{[salt]}{[acid]}$$

$pH = 7$

$pK_a = 5$

$$7 = 5 + \log_{10}\frac{[salt]}{[acid]}$$

$$\log_{10}\frac{[salt]}{[acid]} = 2$$

$$\frac{[salt]}{[acid]} = 10^2 = 100$$

22. **(4)**

Enthalpy of formation is the same as the enthalpy of reaction when 1 mole of product is formed. Hence the enthalpy of formation of HCl(g) is − 22 kcal.

23. **(4)**

$_7N \rightarrow 1s^2 2s^2 2p^3$ | 1 | 1 | 1 |

$_8O \rightarrow 1s^2 2s^2 2p^4$ | 1↓ | 1 | 1 |

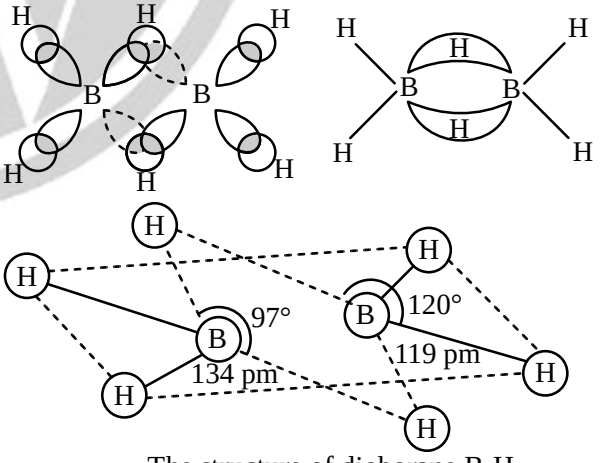
I.E of N is greater than that of O due to presence of half-filled atomic orbital.

24. **(4)**

$2Al + 2NaOH + 6H_2O \rightarrow 2Na[Al(OH)_4] + 3H_2$.

25. **(3)**

The structure of diborane is shown in the figure. The four-terminal hydrogen atoms and the two boron atoms lie in one plane. Above and below this plane, there are two bridging hydrogen atoms. The four-terminal B-H bonds are regular two centre-two electron bonds while the two bridge (B-H-B) bonds are different and can be described in terms of three centre - two e bonds. The terminal hydrogens do not lie in the same plane as the boron hydrogen banana bonds. Each B atom uses sp^3 hybrids for bonding. Out of the four sp^3 hybrids on each B atom, one is without an electron shown in broken lines.



The structure of dioborane B_2H_6

26. **(2)**

Fluorine has highest electronegativity in periodic table.

27. **(3)**

When pressure is increased, the equilibrium will shift to product side (which contains less number of moles of gaseous species). This nullifies the effect of increase in pressure. Hence, more and more product will be formed. According to Le Chatelier's principle, when a system at equilibrium is disturbed, the position of the equilibrium shifts in a direction so that the effect of the change is nullified. Low temperature favours exothermic reaction. Heat is evolved during the reaction (positive value of enthalpy change).

28. **(4)**

Hydrogen gas is used in the hydrogenation of oils in the presence of Ni catalyst to give vanaspathi. By hydrogenation of oil, the unsaturated oils are converted to saturated vanaspathi.

29. **(1)**

Ionisation energy decreases on moving down the group due to increase the distance between valance electron and nucleus.

30. **(3)**

Ostwald's dilution law is valid for weak electrolytes.

31. **(2)**

Initial $\Rightarrow$ $[OH^-]$ $= 10^{-2}$ M $\therefore$ pH = 12

Final $\Rightarrow$ $[OH^-] = 10^{-2} + \dfrac{0.04}{40 \times 0.1} = 2 \times 10^{-2}$

$\therefore$ pH = 12.3

So, change = 12.3 – 12 = + 0.3

32. **(1)**

Zeolites are aluminosilicates of sodium and potassium used in softening of hard water.

33. **(4)**

Amphoteric means species which can accept as well as lose H^+.

34. **(4)**

	ClO_3^-	and	SO_3^{2-}
Hybridization	sp^3		sp^3

Both are pyramidal in shape.

According to VSEPR theory molecules with three bond pairs have trigonal planar geometry.

35 **(1)**

$$\text{B.Pt } \alpha \frac{\text{M.wt}}{\text{Branching}}$$

B. Pt $\Rightarrow$ n-Pentane > iso-Pentane > neo-Pentane

36. **(1)**

$C_2 = (\sigma\ 1s)^2 < (\sigma^*\ 1s)^2 < (\sigma\ 2\ s)^2 < (\sigma\ *\ 2\ s)^2 < (\pi\ 2\ px)^2 = (\pi\ 2\ py)^2$

Bond order =

$$\frac{\text{Number of electrons in bonding molecular orbital} - \text{Number of electrons in anti-bonding molecular orbital}}{2}$$

$$\text{Bond order} = 8 - \frac{4}{2} = 2$$

37. **(4)**

(a) $CH_3 - CH_2 - CH_2 - CH_2 - NH_2$

(b) $CH_3 - CH_2 - \underset{\displaystyle NH_2}{\underset{|}{CH}} - CH_3$

(c) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - NH_2$

(d) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}} - NH_2$

(e) CH_3-CH_2-CH_2-NH-CH_3

(f) CH_3-CH_2-NH-CH_2-CH_3

(g) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - NH - CH_3$

(h) $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{N}} - CH_3$

The pairs (a) and (b) and (e) and (g) exhibit position isomerism. The pairs (a) and (c); (a) and (d); (b) and (c); (b) and (d) exhibit chain isomerism. The pairs (e) and (f) and (f) and (g) exhibit metamerism. All primary amines exhibit functional isomerism with secondary and tertiary amines and vice-versa.

38. **(4)**

As $\Delta G^\circ > 0$, the equilibrium constant K would be less than 1 ($\Delta G^\circ = -RT\ln k$).

39. **(2)**

pH = 6, $[H^+] = 10^{-6}$

pH = 4, $[H^+] = 10^{-4}$

Let volume = 1L

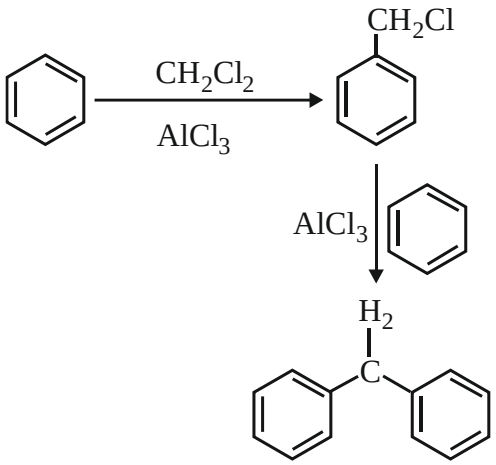
New $[H^+]$

$= \dfrac{10^{-6} + 10^{-4}}{2}$

$= 5.05 \times 10^{-5}$

pH = $-\log[H^+]$ = 4.29

40. **(4)**



(Diphenyl methane)

41. **(2)**

$^{+}CH = CH_2$ is least stable because positive charge is present on sp^2 hybridized carbon and not getting stabilized by inductive effect, hyperconjugation and resonance.

42. **(4)**

All three reagent except ammonical $AgNO_3$ reacts with 1, 2 and 4 compounds, the compounds 3 possessing the terminal alkyne only reacts with ammonical $AgNO_3$ and thus can be distinguished from 1, 2 and 4 compounds.

43. **(3)**

The o-Nitrophenols and p-Nitrophenols are separated by steam distillation since o-isomer is steam volatile due to intramolecular H-bonding while p-isomer is not steam volatile due to association of molecule by Intermolecular H-bonding.

44. **(4)**

Since, ionic product of solution,

$$K_a.K_h = K_w$$

$$\Rightarrow \quad K_h = \frac{K_w}{K_a}$$

Hydrolysis constant, K_h is inversely proportional to K_a, i.e. more will be K_a less will be its hydrolysis.

Here, K_a of HD is least (i.e. 4×10^{-10}). So, it will be most hydrolysed.

45. **(1)**

Hybridization	sp^3	sp^2	sp
Percentage s-character	25%	33.33%	50%

Percentage s-character α electronegativity

46. **(4)**

In Ne the atoms are held together by vander waals forces.

47. **(3)**

Conjugate acid is the protonated form of an anion or any species which can take up a proton.

48. **(3)**

Molecules	Hybridization	Shape
PCl_5	sp^3d	Trigonal bipyramidal
SF_4	sp^3d	See saw
XeF_4	sp^3d^2	Square planar
BF_3	sp^2	Trigonal planar

49. **(3)**

Z_{eff} is higher, because the radius of the cation is smaller than the radius of the neutral atom.

50. **(3)**

They have the same atomic number (17), the same number of electrons (17) and the same number of protons (17). They have different mass numbers (35 and 37) and different numbers of neutrons. $_{17}Cl^{35}$ has $35 - 17 = 18$ neutrons whereas $_{17}Cl^{37}$ has $35 - 17 = 20$ neutrons.