

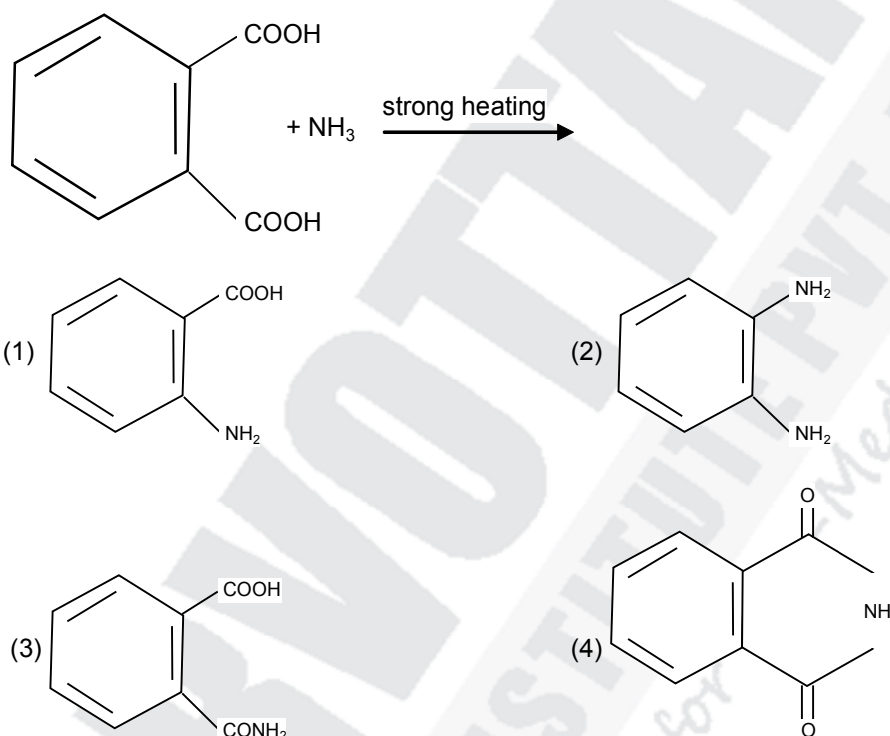
CHEMISTRY

Q.1 Which of the following species is not stable ?

- (1) $[\text{Sn}(\text{OH})_6]^{2-}$ (2) $[\text{SiCl}_6]^{2-}$ (3) $[\text{SiF}_6]^{2-}$ (4) $[\text{GeCl}_6]^{2-}$

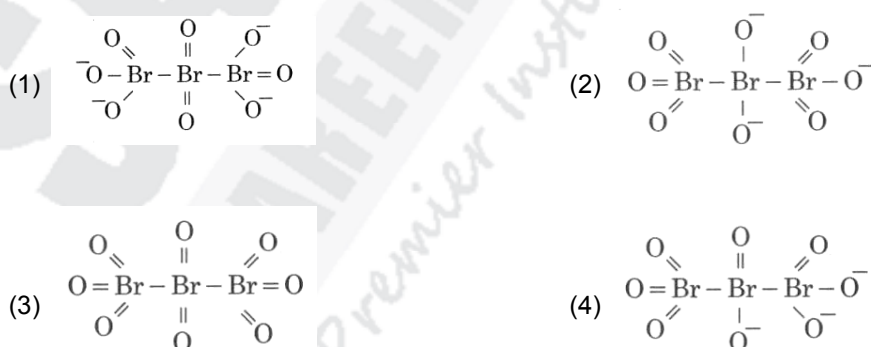
Ans. (2)

Q.2 The major product of the following reaction



Ans. (4)

Q.3 The correct structure of tribromooxide is :



Ans. (3)

Q.4 Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is

[Given that 1 L bar = 100 J]

- (1) 25 J (2) 30 J (3) -30 J (4) 5 kJ

Ans. (3)

Q.5 A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The correct option about the gas and its compressibility factor (Z) is :

- (1) $Z < 1$ and attractive forces are dominant
(2) $Z < 1$ and repulsive forces are dominant
(3) $Z > 1$ and attractive forces are dominant
(4) $Z > 1$ and repulsive forces are dominant

Ans. (1)

Q.6 A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is:

- (1) C_3A_4 (2) C_4A_3 (3) C_2A_3 (4) C_3A_2

Ans. (1)

Q.7 If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by:

- (1) $t = 4.606/k$ (2) $t = 2.303/k$ (3) $t = 0.693/k$ (4) $t = 6.909/k$

Ans. (1)

Q.8 The **correct** order of the basic strength of methyl substituted amines in aqueous solution is :

- (1) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$ (2) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
(3) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$ (4) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$

Ans. (3)

Q.9 For a cell involving one electron $E_{cell}^- = 0.59V$ at 298 K, the equilibrium constant for the cell reaction is :

[Given that $\frac{2.303RT}{F} = 0.059V$ at $T = 298K$]

- (1) 1.0×10^{10} (2) 1.0×10^{30} (3) 1.0×10^2 (4) 1.0×10^5

Ans. (1)

Q.10 Which of the following is **incorrect** statement ?

- (1) GeX_4 (X = F, Cl, Br, I) is more stable than GeX_2
- (2) SnF_4 is ionic in nature
- (3) PbF_4 is covalent in nature
- (4) SiCl_4 is easily hydrolysed

Ans. (3)

Q.11 Match the Xenon compounds in **Column – I** with its structure in **Column – II** and assign the **correct** code:

	Column – I		Column-II
(a)	XeF_4	(i)	pyramidal
(b)	XeF_6	(ii)	square planar
(c)	XeOF_4	(iii)	distorted octahedral
(d)	XeO_3	(iv)	square pyramidal

Code:

- | (a) | (b) | (c) | (d) |
|-----|-------|-------|------------|
| (1) | (ii) | (iii) | (i) (iv) |
| (2) | (iii) | (iv) | (i) (ii) |
| (3) | (i) | (ii) | (iii) (iv) |
| (4) | (ii) | (iii) | (iv) (i) |

Ans. (4)

Q.12 The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is :

- (1) 30 (2) 40 (3) 10 (4) 20

Ans. (1)

Q.13 The manganate and permanganate ions are tetrahedral due to :

- (1) The π -bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese
- (2) The π -bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese
- (3) The π -bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese
- (4) There is no π -bonding

Ans. (3)

Q.14 Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (M) as the cofactor M is:

- (1) Ca (2) Sr (3) Be (4) Mg

Ans. (4)

Q.15 What is the **correct** electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?

- (1) $e^3 t_2^3$ (2) $e^4 t_2^2$ (3) $t_{2g}^4 e_g^2$ (4) $t_{2g}^6 e_g^0$

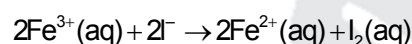
Ans. (4)

Q.16 Among the following, the one that is **not** a green house gas is :

- (1) ozone (2) sulphur dioxide (3) nitrous oxide (4) methane

Ans. (2)

Q.17 For the cell reaction



$$E_{cell}^- = 0.24V \text{ at } 298 \text{ K.}$$

The standard Gibbs energy ($\Delta_r G^\ominus$) of the cell reaction is :

[Given that Faraday constant $F = 96500 \text{ C mol}^{-1}$]

- (1) $46.32 \text{ kJ mol}^{-1}$ (2) $23.16 \text{ kJ mol}^{-1}$ (3) $-46.32 \text{ kJ mol}^{-1}$ (4) $-23.16 \text{ kJ mol}^{-1}$

Ans. (3)

Q.18 Which mixture of the solutions will lead to the formation of negatively charged colloidal $[AgI]^-$ sol. ?

- (1) 50 mL of 2 M $AgNO_3$ + 50 mL of 1.5 M KI
(2) 50 mL of 0.1 M $AgNO_3$ + 50 mL of 0.1 M KI
(3) 50 mL of 1 M $AgNO_3$ + 50 mL of 1.5 M KI
(4) 50 mL of 1 M $AgNO_3$ + 50 mL of 2 M KI

Ans. (3, 4)

Q.19 Which one is malachite from the following?

- (1) Fe_3O_4 (2) $CuCO_3 \cdot Cu(OH)_2$ (3) $CuFeS_2$ (4) $Cu(OH)_2$

Ans. (2)

Q.20 Among the following , the narrow spectrum antibiotic is :

- (1) amoxicillin (2) chloramphenicol (3) penicillin G (4) ampicillin

Ans. (3)

Q.21 Which of the following is an amphoteric hydroxide?

- (1) Mg(OH)₂ (2) Be(OH)₂ (3) Sr(OH)₂ (4) Ca(OH)₂

Ans. (2)

Q.22 The non-essential amino acid among the following is :

- (1) alanine (2) lysine (3) valine (4) leucine

Ans. (1)

Q.23 Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory ?

- (1) C₂ (2) Be₂ (3) O₂ (4) N₂

Ans. (1)

Q.24 The biodegradable polymer is-

- (1) nylon-6 (2) Buna-S (3) nylon-6,6 (4) nylon 2-nylon 6

Ans. (4)

Q.25 In which case change in entropy is negative ?

- (1) Sublimation of solid to gas
(2) $2\text{H(g)} \rightarrow \text{H}_2\text{(g)}$
(3) Evaporation of water
(4) Expansion of a gas at constant temperature

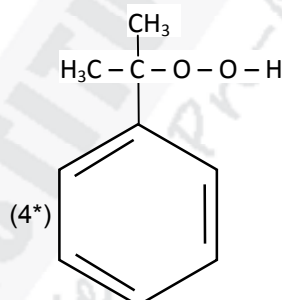
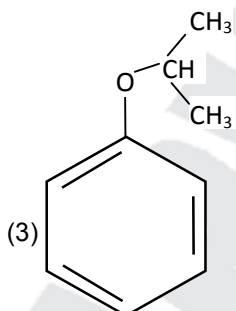
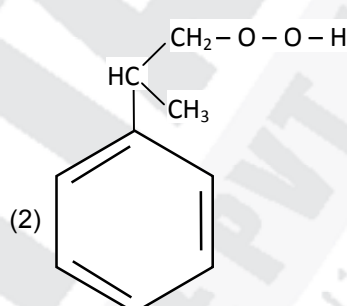
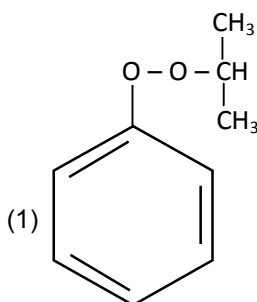
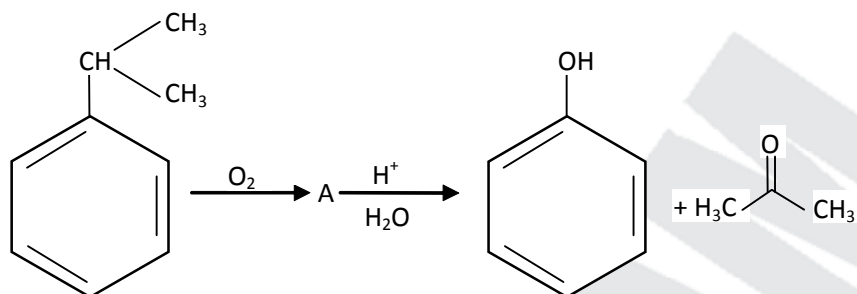
Ans. (2)

Q.26 The mixture that forms maximum boiling azeotrope is:

- (1) Acetone + Carbon disulphide
(2) Heptane + Octane
(3) Water + Nitric Acid
(4) Ethanol + Water

Ans. (3)

Q.27 The structure of intermediate A in the following reaction, is:



Ans. (4)

Q.28 Match the following:

- | | |
|----------------------|-----------------------------------|
| (a) Pure nitrogen | (i) Chlorine |
| (b) Haber process | (ii) Sulphuric acid |
| (c) Contact process | (iii) Ammonia |
| (d) Deacon's process | (iv) Sodium azide or Barium azide |

Which of the following is the correct option ?

- | | | | | |
|-----|-------|-------|-------|-------|
| | (a) | (b) | (c) | (d) |
| (1) | (iii) | (iv) | (ii) | (i) |
| (2) | (iv) | (iii) | (ii) | (i) |
| (3) | (i) | (ii) | (iii) | (iv) |
| (4) | (ii) | (iv) | (i) | (iii) |

Ans. (2)

Q.29 For the chemical reaction
 $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The correct option is :

(1) $-\frac{d[N_2]}{dt} = \frac{1}{2} \frac{d[NH_3]}{dt}$

(2) $3 \frac{d[H_2]}{dt} = 2 \frac{d[NH_3]}{dt}$

(3) $-\frac{1}{3} \frac{d[H_2]}{dt} = -\frac{1}{2} \frac{d[NH_3]}{dt}$

(4) $-\frac{d[N_2]}{dt} = 2 \frac{d[NH_3]}{dt}$

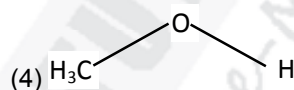
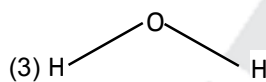
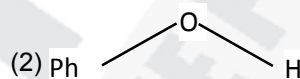
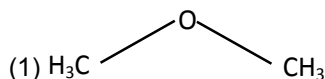
Ans. (1)

Q.30 Which will make basic buffer ?

- (1) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH
 (2) 100 mL of 0.1 M HCl + 100 mL of 0.1 M NaOH
 (3) 50 mL of 0.1 M NaOH + 25 mL of 0.1 M CH_3COOH
 (4) 100 mL of 0.1 M CH_3COOH + 100 mL of 0.1 M NaOH

Ans. (1)

Q.31 The compound that is most difficult to protonate is



Ans. (2)

Q.32 Which of the following reactions are disproportionation reaction ?

- (a) $2Cu^+ \rightarrow Cu^{2+} + Cu^0$
 (b) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$
 (c) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$
 (d) $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^+$

Select the **correct** option from the following :

- (1) (a), (c) and (d) (2) (a) and (d) only
 (3) (a) and (b) only (4) (a), (b) and (c)

Ans. (3)

Q.33 Identify the incorrect statement related to PCl_5 from the following :

- (1) Axial P—Cl bonds are longer than equatorial P—Cl bonds
 (2) PCl_5 molecule is non-reactive
 (3) Three equatorial P—Cl bonds make an angle of 120° with each other
 (4) Two axial P—Cl bonds make an angle of 180° with each other

Ans. (2)

Q.34 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The **correct** option is :

- (1) $6p > 5f > 4d > 5p$
- (2) $5f > 6p > 4d > 5p$
- (3) $5f > 6p > 5p > 4d$
- (4) $6p > 5f > 5p > 4d$

Ans. (3)

Q.35 The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne is :

- (1) 11 σ bonds and 2 π bonds
- (2) 13 σ bonds and no π bonds
- (3) 10 σ bonds and 3 π bonds
- (4) 8 σ bonds and 5 π bonds

Ans. (3)

Q.36 Which is the **correct** thermal stability order for H_2E (E = O, S, Se, Te and Po) ?

- (1) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$
- (2) $H_2Se < H_2Te < H_2Po < H_2O < H_2S$
- (3) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$
- (4) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$

Ans. (1)

Q.37 Conjugate base for Brönsted acids H_2O and HF are :

- (1) OH^- and F^- , respectively
- (2) H_3O^+ and H_2F^+ , respectively
- (3) OH^- and H_2F^+ , respectively
- (4) H_3O^+ and F^- , respectively

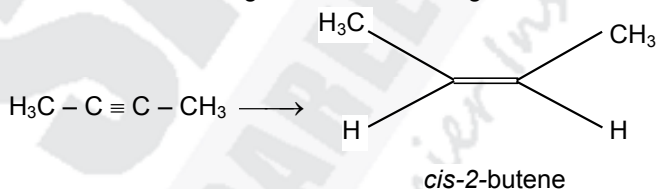
Ans. (1)

Q.38 Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region ?

- (1) Paschen series
- (2) Brackett series
- (3) Lyman series
- (4) Balmer series

Ans. (4)

Q.39 The most suitable reagent for the following conversion is :



- (1) Zn/HCl (2) $Hg^{2+}/H^+, H_2O$ (3) $Na/liquid\ NH_3$ (4) $H_2, Pd/C, quinoline$

Ans. (4)

Q.40 For the second period elements the **correct** increasing order of first ionization enthalpy is :

- (1) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (2) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$
- (3) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (4) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$

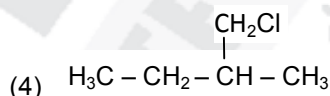
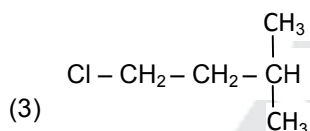
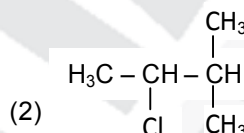
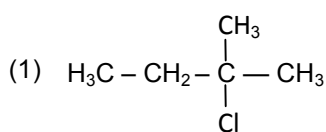
Ans. (4)

Q.41 pH of a saturated solution of $\text{Ca}(\text{OH})_2$ is 9. The solubility product (K_{sp}) of $\text{Ca}(\text{OH})_2$ is :

- (1) 0.125×10^{-15}
- (2) 0.5×10^{-10}
- (3) 0.5×10^{-15}
- (4) 0.25×10^{-10}

Ans. (3)

Q.42 An alkene "A" on reaction with O_3 and $\text{Zn} - \text{H}_2\text{O}$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is :



Ans. (1)

Q.43 The method used to remove temporary hardness of water is :

- (1) Ion-exchange method
- (2) Synthetic resins method
- (3) Calgon's method
- (4) Clark's method

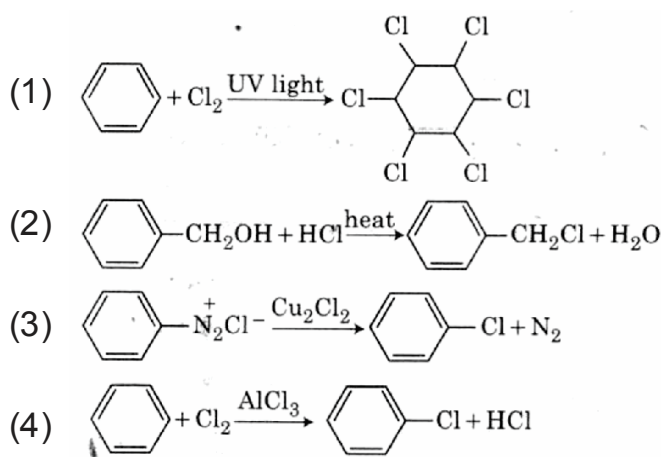
Ans. (4)

Q.44 For an ideal solution, the **correct** option is :

- (1) $D_{\text{mix}} H = 0$ at constant T and P
- (2) $D_{\text{mix}} G = 0$ at constant T and P
- (3) $D_{\text{mix}} S = 0$ at constant T and P
- (4) $D_{\text{mix}} V \neq 0$ at constant T and P

Ans. (1)

Q.45 Among the following, the reaction that proceeds through an electrophilic substitution, is :



Ans (4)

ADMISSION OPEN Session 2019-20

PRE-NURTURE

SUDHRADH

VII to VIII Moving Students
Phase -2 **13th May 2019**
Phase -3 **24th June 2019**
(1 Yr. Classroom)
Medium: English

SAKSHAM

VIII to IX Moving Students
Phase -2 **13th May 2019**
Phase -3 **24th June 2019**
(1 Yr. Classroom)
Medium: English

DAKSH

IX to X Moving Students
Phase -2 **13th May 2019**
Phase -3 **24th June 2019**
(1 Yr. Classroom)
Medium: English

PRE-MEDICAL

NURTURE

X to XI Moving Students
Phase -3 **20th May 2019**
Phase -4 **10th June 2019**
(2 Yr. Classroom)
Medium: English

ENTHUSE

XI to XII Moving Students
Phase -2 **15th May 2019**
(1 Yr. Classroom)
Medium: English

ACHIEVER

XII Passout Students
Phase -1 **13th May 2019**
Phase -2 **3rd June 2019**
Phase -3 **17th June 2019**
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