PRACTICE PAPER

CHEMISTRY

Q1.

1-Butyne reacts with hot alkaline $KMnO_4$ to produce

(a) $CH_3CH_2CH_2COOH$
(b) CH_3CH_2COOH
(c) $CH_3CH_2COOH+CO_2$
(d) $CH_3CH_2COOH + HCOOH$

Q2.

Reduction of benzoyl chloride with $H_2/Pd/BaSO_4$ produces

(a) Benzoyl cyanide
(b) Benzaldehyde
(c) Benzoic acid
(d) None of the above

Q3.

In a reaction A→B, the rate of reaction increases two times on increasing the concentration of reactant four times. Then order of reaction is

(a) Zero
(b) Two
(c) Half
(d) Four

Q4.

A current of 2 amperes is passed through a solution of H_2SO_4 for 20 minutes. The volume of oxygen liberated at STP is:

(a) 1.392 ml
(b) 0.1392 L
(c) 1.392 L
(d) 139.2 L

Q5.

Which of the following is not an aromatic compound?

(a) Benzene   (b). Cyclobutadiene
(c) Orthoxylene   (d). Picric Acid

Q6.

Which of the following is not colored?

  (a) $Na_2[CuCl_4]$
  (b) $Na_2[CdCl_4]$
  (c) $K_4[Fe(CN)_6]$
  (d) $K_3[Fe(CN)_6]$

Q7.

The enthalpy change of reaction does not depend upon

  (a) State of reactants and products
  (b) Nature of reactants and products
  (c) Different intermediates of a reaction
  (d) Initial and final enthalpy change

Q8.

The compressibility factor for an ideal gas is

  (a) Zero
  (b) One
  (c) Two
  (d) Six

Q9.

Calcium is obtained by:

  (a) electrolysis of molten $CaCl_2$
  (b) electrolysis of aqueous $CaCl_2$
  (c) reduction of $CaCl_2$ with C
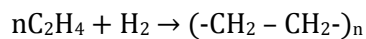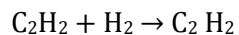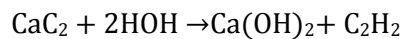 (d) Roasting of its ore with lime stone.

Q10.

Hexyne-3 reacts with Na/NH_2 to produce

  (a) Hexane
  (b) Hexylamine
  (c) Transhexene
  (d) Cis-hexene

Q11.

The formation of polyethene from calcium carbide takes place as follows :

$CaC_2 + 2HOH \rightarrow Ca(OH)_2 + C_2H_2$

$C_2H_2 + H_2 \rightarrow C_2 H_2$

$nC_2H_4 + H_2 \rightarrow (\text{-}CH_2 - CH_2\text{-})_n$

Then the amount of polythene obtained from 64 kg of calcium carbide is

    (a) 7 kg
    (b) 14 kg
    (c) 21 kg
    (d) 28 kg

Q12.

$K_2 [Hgl_4]$ detects the ion/group.

    (a) NH_2
    (b) NO
    (c) NH_4^+
    (d) CI

Q13.

Which one of the following can give iodometrictitration ?

    (a) Fe^{3+}
    (b) Pb^{2+}
    (c) Cu^{2+}
    (d) Ag^{2+}

Q14.

O_2 is

    (a) Paramagnetic   (b) Diamagnetic

    (c) Ferromagnetic   (d) Cation

Q15.

Two solutions having pH 1 and 2, are mixed. Then the resulting pH will be

    (a) 1.76   (b). 0.96

    (c) 1.26   (d). 1.5

Q 16.

If 1, 3-dibromopropane reacts with Zn, the product obtained is

    (a) Propene
    (b) Propane
    (c) Cyclopropane
    (d) Hexane

Q 17.

Hydrolysis of methyl cyanide yields:

    (a) Formic Acid
    (b) Formaldehyde
    (c) Acetaldehyde
    (d) Acetic Acid

Q 18.

The number of stereosiomers of the compounds $CH_3CHBrCHBrCOOH$ and $CH_3CHBrCHBrCH_3$ respectively are :

    (a) 0,0
    (b) 4,4
    (c) 3,4
    (d) 4,3

Q 19.

In the compound lithium aluminium hydride, the hydrogen is present as

    (a) H^+
    (b) H
    (c) H^-
    (d) None of these

Q 20.

IUPAC name of $(CH_3)_3$ C-CH $=$ CH_2 is

    (a) 2,2, Dimethyl but-3-ene
    (b) 2, 2 Dimethyl pent-4-ene
    (c) 3, 3 Dimethyl but-1-ene
    (d) None of the above

Q 21.

In the reaction of $I_2 + I \rightarrow I_3$; the Lewis base is

  (a) I_2
  (b) I^-
  (c) I_3^-
  (d) None of these

Q 22.

A green mass is formed in the charcoal cavity test when a colorless salt (X) is fused with cobalt nitrate, X contains.

  (a) A^{3+}
  (b) Cu^{2+}
  (c) Ba^{2+}
  (d) Zn^{2+}

Q 23.

$R\text{-}CH_2CH_2OH$ can be converted into $R\text{-}CH_2CH_2COOH$ with the help of

  (a) PHr_3, KCN, H^+
  (b) PBr_3, KCN, H_{2E}
  (c) KCN, H^+
  (d) $KMnO_4$, H_2SO_4

Q 24.

A metal hydroxide is soluble in excess of sodium hydroxide solution. the metal ion in hydroxide is :

  (a) Fe^{3+}
  (b) Cr^{3+}
  (c) Al^{3+}
  (d) Any of these

Q 25.

The wrong statement about diborane is

  (a) There is a bridge bonding in a diborane
  (b) All the six B-H bonds are similar
  (c) Four H-atoms are terminal while two are bridged H-atom
  (d) in B_2H_6 boron shows sp^3 hybridization

Q 26.

SiO$_2$ is

    (a) sp hybridized
    (b) sp^2 hybridized
    (c) sp^3 hybridized
    (d) sp^3 hybridized

Q 27.

The halide of phosphorous that undergoes rapid hydrolysis is

    (a) CPI$_3$
    (b) PF$_3$
    (c) PBr$_3$
    (d) PI$_3$

Q 28.

The oxidation state of nickel in Ni(CO)$_4$ is

    (a) 4
    (b) 2
    (c) 0
    (d) 1

Q 29.

Identify Z in the following series

(Image)

    (a) C$_2$H$_5$I
    (b) C$_2$H$_5$OH
    (c) CHI$_3$
    (d) CH$_3$CHO

Q 30.

The role of acetic anhydride which is used as a solvent in CrO$_3$ oxidation of toluene to benzaldehyde is to:

    (a) Protect CrO$_3$ against atmospheric moisture.
    (b) Act as a catalyst.
    (c) Protect further oxidation of benzaldehyde.
    (d) all the above

Q1.

If E is energy, M is mass, J is angular momentum and G is universal gravitational constant, then dimensions of $x = \frac{EJ^2}{G^2 M^s}$ are that of

(a) Angle
(b) Angular velocity
(c) Area
(d) Acceleration

Q2.

V and a represent velocity and acceleration of a particle in one dimensional motion

(a) For v and a both being negative or v being negative and a positive, the speed of particle may be increasing.
(b) Speed of particle remains same with change in magnitude of v and a
(c) Speed of particle increases when a is negative
(d) Speed of particle always decreases when v is negative.

Q3

By A principle a dynamic system can be converted to a static system by introducing B force. Then A and B stand for

(a) Lami's, vector
(b) D'Alembert's inertia
(c) Vector, polar
(d) Conservation of momentum, axial

Q4.

Two glass balls, two ivory balls, two cork balls, two cast iron balls and two lead balls collide, then

(a) Coefficient of restitution is maximum for glass balls
(b) Coefficient of restitution is maximum for ivory balls
(c) Coefficient of restitution is maximum for lead balls
(d) Coefficient of restitution is least for cork balls

Q5.

A ball on at rest on a horizontal surface enjoys

(a) Absence of inertia
(b) Absence of gravity
(c) Absence of accelerating force
(d) Free fall of spaceship

Q 7.

Cold fluid flows sluggishly because of

(a) Cohesion
(b) Adhesion
(c) Surface tension
(d) Viscosity

Q 8.

The neutral temperature of a thermocouple depends upon

(a) Temperature of hot junction
(b) Temperature of cold junction
(c) Temperature of inversion
(d) None of these

Q 9.

In mixture of ideal gases, the molecules have the same

(a) Speed
(b) Mean speed
(c) Mean translational kinetic energy
(d) Root mean square momentum

Q 10.

The period of oscillations of a simple pendulum is T in a stationary lift. If the lift moves upwards with an acceleration 5g, the period will

(a) Remain the same
(b) Increase by 3/5
(c) Decrease by 3/2
(d) None of these

Q 11.

A tunnel is dug along the diameter of the earth The time period of the dropped body in the tunnel is T_1. If T_2 is the time period of similar body dropped I a straight tunnel dug along any chord except through the centre of the earth, then

(a) $T_2 < T_1$
(b) $T_2 = T_1$
(c) $T_2 > T_1$
(d) Any above three

Q 12.

A parallel plate capacitor is charged by connecting its plates to a battery. Without disconnecting the battery, a dielectric is introduced between its plate, then

    (a) Potential difference between the plates increases
    (b) Charge on the plate decreases.
    (c) Capacitance of the capacitor decreases
    (d) Energy of the capacitor decreases

Q 13.

An electric bulb is designed to draw power P_0 at a voltage V_0. If the bulb draws a power at a voltage V then

    (a) $P = \left[\dfrac{v}{v_0}\right]^2 P_0$
                      (b) $P = \left[\dfrac{v_0}{v}\right]^2 P_0$

    (c) $P = \left[\dfrac{v_0}{v}\right] P_0$
                        (d) $P = \dfrac{v_0}{v} P_0$

Q 14.

An electron of mass m_e and a proton of mass m_p are injected into a uniform magnetic field at right angles to the direction of the field, with equal velocity, The ratio of the radii of their orbits r_e/r_p is equal to

    (a) 2
    (b) M_e/m_p
    (c) 1
    (d) M_p/m_e

Q 15.

Susceptibility of a magnetic substance is found to depend upon temperature and the intensity of the magnetizing field. The material is a

    (a) Paramagnetic
    (b) Superconductor
    (c) Diamagnetic
    (d) Ferromagnetic

Following question consists of two statements printed as Statement 1 and Statement 2. While answering these questions you are required to select any one of the responses indicted as

    (a) If both Statement 1 and Statement 2 are true and Statement 2 is not a correct 2 are true but the Statement is 2 is a correct explanation of Statement 1.
    (b) If both Statement 1 and Statement 2 are true but the statement 2 is not a correct explanation of Statement 1.
    (c) If Statement 1 is true but the Statement 2 is false.
    (d) If statement 1 is false but Statement 2 is true.

Q 16.

Statement 1: For very high frequency of a.c, inductor behaves as an open circuit and capacitor behayes as a conductor

Statement 2: Inductive reactance for d.c. is zero and capacitive reactance is infinity

    (a) 1
    (b) 2
    (c) 3
    (d) 4

Q 17.

A small magnet M is allowed to fall through a fixed horizontal conducting ring. Let g be the acceleration due to gravity. Then the acceleration of M will be

    (a) Greater than g, when it is below R and moving away from R
    (b) Equal to g when it is below or above R and moving towards or away from R
    (c) Less than g when it is above R and moving towards R
    (d) Greater than g when it is above R and moving towards R

Q 18.

The phase and orientation of magnetic vector associated with electromagnetic oscillations differ respectively from those of electric vector by

    (a) Zero and zero
    (b) Zero and $\pi/2$
    (c) $\pi/2$ and $\pi/2$
    (d) $\pi/2$ and zero

Q 19.

In a Fraunhoffer diffraction experiment at a single slit using light of wavelength 400 mm, the first minimum is formed at an angle of 30°, the direction θ of the first secondary maximum is given by

    (a) $\tan^{-1} (3/4)$
    (b) $\sin^{-1} (3/4)$
    (c) 60°
    (d) $\text{Tan}^{-1} (4/3)$

Read the following paragraph:

A point object is placed at a distance of 12 cm on the axis of a convex lens of focal length 10 cm. On the other side of the lens, a convex mirror is placed at a distance of 10 cm from the lens such that the image formed by the combination coincided with the object itself.

Q 20.

Distance of the image in the absence of mirror is

    (a) 30 cm
    (b) 45 cm
    (c) 60 cm
    (d) 75 cm

Q 21.

Focal length of convex mirror is

    (a) 52 cm   (b)   25 cm
    (c) 32 cm   (d)   15 cm

Q 22.

An electron and a proton have the same the Broglie wavelength. Then the kinetic energy of the electron is

    (a) Greater than the kinetic energy of the proton
    (b) Zero
    (c) Equal to the kinetic energy of the proton
    (d) Infinity

Q 23.

The transition from state n = 4 to n = 3 in a hydrogen like atom results in ultraviolet radiation. The following transition will give the infra red radiations

    (a) $2 \rightarrow 1$ (b) $3 \rightarrow 2$

    (c) $4 \rightarrow 2$ (d) $5 \rightarrow 4$

Q 24.

The number of atoms in a radioactive sample reduces from 1000 to 100 in two days. The number of atoms remaining at the end of four days will be

    (a) 25   (b) 20

    (c) 10   (d) 50

Q 25.

An intrinsic semiconductor has 10^8 m^{-3} free electrons and is doped with pentavalent impurity atoms of density 10^{24} m^{-3} . The free electron density will increase by orders of magnitude

    (a) 10^{24} m^{-3} (b) 10^{22} m^{-3}

    (c) 10^{20} m^{-3} (d) 10^{26} m^{-3}

Q 26.

If the sum of the heights of transmitting and receiving antennae in line for sight of communication is fixed at h, the range is maximum when the two antennae have the height

(a) H each

(b) 2h each

(c) h/2 each

(d) h/3 each

Q 27.

Imagine a light planet revolving around a very massive star a circular orbit of radius R with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to $R^{-5/2}$, then

(a) T^2 is Proportional to R^2
(b) T^2 is Proportional to $R^{7/2}$
(c) T^2 is Proportional to $R^{3/2}$
(d) T^2 is Proportional to $R^{3.75}$

Q 28.

A uniform chain of length L and mass M is lying on a smooth table and one third of its length is hanging vertically down over the edge of the table. If g is the acceleration ndue to gravity, the work required to pull the hanging part on the table is

(a) MgL

(b) MgL/3

(c) MgL/9

(d) MgL/18

Q 29.

Two particles A and B initially at rest, move towards each other by mutual force of attraction. At the instant when the speed of A is v and the speed of B is 2v, the centre of the mass of the system will move with the speed

(a) 3 v

(b) V

(c) 1.5 v

(d) Zero

Q 30.

A particle undergoes uniform circular motion About which point on the plane of the circle, will the angular momentum of the particle remain conserved?

(a) Centre of Circle
(b) On thecircumference of circle
(c) Inside the circle
(d) Outside the circle

MATHEMATICS

Q 1.

If Re $\left(\frac{az+b}{cz+d}\right) = 1$ (where z is a complex number and a, b, c, d are real numbers,) then z lies on

    (a) a circle
    (b) straight line
    (c) an ellipse
    (d) a hyper bola

Q 2.

Number of real roots of the equation $\sqrt{x}\sqrt{x - \sqrt{(1-x)}} = 1$ is

    (a) 0
    (b) 1
    (c) 2
    (d) 3

Q 3.

Number of identical terms in the sequence $2, 4, 6, 8, \ldots\ldots$ upto 100 terms and $1, 4, 7, 10, \ldots\ldots$ upto 100 terms are

    (a) 20
    (b) 33
    (c) 35
    (d) 40

Q 4.

The total number of integral solution for x, y, z such that $xyz = 36$ is

    (a) 12
    (b) 18
    (c) 24
    (d) 30

Q 5.

The number $7^{20} - 5^{20}$ is divible by

    (a) 2
    (b) 3
    (c) 4
    (d) 6

Q 6.

If $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$ and

$\Delta_2 = \begin{vmatrix} 1 & 1 & 1 \\ bc & ca & ab \\ 2a & 2b & 2c \end{vmatrix}$ then

    (a) $2\Delta_1 + \Delta_2 = 0$
    (b) $\Delta_1 + 2\Delta_2 = 0$
    (c) $\Delta_1 + \Delta_2 = 0$
    (d) $\Delta_1 = \Delta_2$

Q 7.

If A is an orthogonal matrix, then

    (a) $AA^{-1} = I$
    (b) $AA^T = I$
    (c) $A^T A^{-1} = I$
    (d) $A^T = A$

Q 8.

The number $\log_{20} 3$ lies in

    (a) $\left(\frac{1}{2}, \frac{5}{4} \right)$
    (b) $\left(\frac{1}{3}, \frac{1}{2} \right)$
    (c) $\left(\frac{1}{5}, \frac{1}{4} \right)$
    (d) $\left(\frac{1}{4}, \frac{1}{3} \right)$

Q 9.

There of the six vertices of a regular hexagon are selected at random. The probability that the triangle formed by these vertices is equilateral is

    (a) $\frac{1}{10}$
    (b) $\frac{1}{6}$
    (c) $\frac{1}{20}$
    (d) $\frac{1}{2}$

Q 10.

A man is known to speak truth is 75% cases. If the throws unbiased die simultaneously and tells that sum on die is eight, then the probability that it is actually eight is

(a) $\frac{3}{4}$

(b) $\frac{5}{36}$

(c) $\frac{31}{36}$

(d) $\frac{15}{46}$

Q 11.

Range of the function

$f(x) = 1 + \cos^2 X + \cos^4 + \ldots\ldots\ldots;$

$x \in \left(\frac{-\pi}{2}, 0\right)$ *is*

(a) $(0, \infty)$

(b) $(1, \infty)$

(c) $(-\infty, 0)$

(d) $(-\infty, \infty)$

Q 12.

The domain of the function

$f(x) = \sin^{-1}\left(\frac{1-|x|}{3}\right) + \tan^{-1}\left(\frac{1-|x|}{3}\right)$ is

(a) [-1, 1]

(b) [-2, 2]

(c) [-3, 3]

(d) [-4, 4]

Q 13.

If $f(x) = \frac{1}{2}\left(f(x-1) + \frac{3}{f(x+1)}\right); f(x) > 0 \forall x \in$

R. Then $Lt_{x \to \infty} f(x)$ is equal to

(a) $(a)\sqrt{2}$

(b) $\sqrt{3}$

(c) 2

(d) $\sqrt{5}$

Q 14.

If $f(x) = \begin{cases} \dfrac{\cos^{-1}(\sin x)}{x - \frac{\pi}{2}} & x \neq \frac{\pi}{2} \\ 1 & x = \frac{\pi}{2} \end{cases}$ then

(a) $Lt_{x \to \frac{\pi}{2}} f(x)$ exists

(b) $Lt_{x \to \frac{\pi}{2}} f(x)$ does not exists

(c) $f(x)$ is continuous at $x = \frac{\pi}{2}$

(d) $Lt_{x \to \frac{\pi}{2}} f(x) = 1$

Q 15.

The given function $f(x) = |x - 1| + \cos|x|$ is not dmorentiable at x is equal to

(a) 0

(b) 1

(c) 1

(d) 0 and 1

Q16.

If $y = ee^{x + e^{x + e^{x + \cdots \infty}}}$ then $\dfrac{dy}{dx}$ is equal to

(a) $\dfrac{x}{1+x}$

(b) $\dfrac{x}{1+y}$

(c) $\dfrac{y}{1-y}$

(d) $\dfrac{y}{1-y^2}$

Q17.

If $\sqrt{x - y} \cdot \sqrt{x + y} = c$ then $\left(\dfrac{dy}{dx}\right)_{(a,a)}$ is

(a) $\dfrac{c}{2a}$

(b) $\dfrac{1}{2a}$

(c) $\dfrac{1}{\sqrt{2a}}$

(d) $-\dfrac{c}{\sqrt{2a}}$

Q18.

The period T for simple pendulum is $T = 2\pi \sqrt{\frac{1}{g}}$, Then the error is T due to possible error of 2 % in 1 and 1.5 % in g in

    (a) 0.1
    (b) 0.25
    (c) 0.2
    (d) 1.5

Q 19.

Let $f(x) = \int e^{2x} (x - 4)(x - 5)\, dx$, then f decrease in the interval

    (a) (2, 4)
    (b) (2, 5)
    (c) (4, 5)
    (d) (0, 5)

Q 20.

If $f(x) = e^x \cos x$ where $x \in [0, \pi]$, then f (x) has maximum slope at

    (a) 0
    (b) $\frac{\pi}{4}$
    (c) $\frac{\pi}{2}$
    (d) π

Q 21.

$\int \frac{dx}{(1+x)^{1/2} - (1+x)^{1/3}}$ is equal to

    (a) $2(1+x)^{1/2} + 3(1+x)^{1/3} + 6(1+x)^{1/6} + 6\ln|(1+x)^{1/6} - 1| + c$
    (b) $2(1+x)^{1/2} + 3(1+x)^{1/3} + 6(1+x)^{1/6} + c$
    (c) $6\ln|(1+x)^{1/6} - 1| + C$
    (d) $2(1+x)^{1/2} + 3(1+x)^{1/3} + c$

Q 22.

$\int_0^1 \cos\left(2\cot^{-1} \sqrt{\frac{1+x}{1+x}}\right) dx$ is equal to

    (a) 0
    (b) $\frac{1}{2}$
    (c) -1
    (d) $-\frac{1}{2}$

Q 23.

$\frac{dy}{dx} = \frac{y(x-ylny)}{x(xlnx-y)}$ is equal to

(a) $\frac{xlnx+ylny}{xy} = c$

(b) $xlnx + ylny = c$

(c) $\frac{xlnx}{ylny} = c$

(d) $xlnx - ylny = c$

Q 24.

One of the bisector of the angle between the lines a $(x - 1)^2 + 2h (x - 1) (y - 1) + b (y - 2)^2 = 0$ is $x + 2y - 5 = 0$. The other bisector is

(a) $2x + y = 0$

(b) $2x - y = 0$

(c) $x + 2y = 4$

(d) $x - 2y + 6 = 0$

Q 25.

The equation of the pair of straight lines parallel to y axis and which are tangents to the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ is

(a) $x^2 - 4x - 5 = 0$

(b) $x^2 = 4x + 5 = 0$

(c) $x^2 - 6x + 11 = 0$

(d) $x^2 - 8x + 16 = 0$

Q 26.

The coordinates of the point on the parabola $y^2 = 8x$, which is at minimum distance from the circle $x^2 + (y + 6)^2 = 1$ are

(a) (1m – 4)

(b) (- 2, 4)

(c) (2, - 4)

(d) (0, - 6)

Q 27.

The set of positive value of m for which a line with slope m is common tangent to ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and parabola $y^2 = 4ax$ is given by

(a) (2, 1)

(b) (0, 1)

(c) (2, 4)

(d) (3, 5)

Q 28.

The equation of the plane through the point (1, 2, 3) perpendicular to the planes x + 2y + 4z = 1 and x − 3y − 5z = 2 is

    (a) X + 3y + 3x = 4
    (b) 2x + 5y + 7x = 3
    (c) 2x + 9y − 5z = 5
    (d) 3x + 6y + 8z = 6

Q 29.

$$\sqrt{2 + \sqrt{2 + \sqrt{2 + \ldots\ldots + \sqrt{2(1 - \cos\theta)}}}};\ (\text{n number of 2's}) \text{ is equal to}$$

    (a) $2\mathrm{Sin}\left(\dfrac{\theta}{2^n}\right)$
    (b) $2\mathrm{Sin}\left(\dfrac{\theta}{2^{n+1}}\right)$
    (c) $2\mathrm{Sin}\left(\dfrac{\theta}{2^{n-1}}\right)$
    (d) None of these

Q 30.

The number of solutions of the equation cotx + cosecx = 2sinx lying in the interval [0, 2π] are

    (a) 0
    (b) 1
    (c) 2
    (d) 3