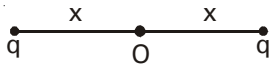
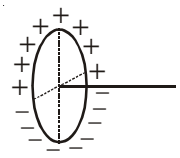
ELECTROSTATICS(FORCE & FIELD)
ASSERTION & REASON

1. 

Assertion : For a system of two identical charges as shown, the electric field at large distances from the charges appear to diverge or converge from O.
Reason : At large distances the seperation between charges is negligible..
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

2. 

Assertion : For a charged ring, which is half uniformly positively charged and half uniformly negatively charged as shown, the electric field at points on axis is along the axis of ring.
Reason : The components of the electric fields of positive half and negative half perpendicular to axis get cancelled.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

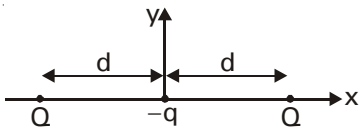
3. **Assertion** : An electric dipole placed in the electric field of a point charge can never experience zero resultant force.
Reason : Electric field of a point charge is non uniform.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

4. **Assertion** : Two similarly charged objects always repel each other.
Reason : Force between them is directly proportional to product of magnitude of charge on each.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

5. **Assertion** : When two bodies are rubbed against each other, they become charged. Change in mass of positively charged body is more than that of negatively charged body.
Reason : Mass of electron is 1840 times less than mass of proton.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

6. **Assertion** : In case of acquiring large amount of charge by a body, the phenomenon of quantisation of charge can be ignored.
Reason : Net charge on a body is always an integral multiple of electronic charge $e = 1.6 \times 10^{-19}$ C .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

7. **Assertion** :A deutron and α -particle are placed in uniform electric field. If a_1 and a_2 be their accelerations respectively then, $a_1 = a_2$.
Reason : In uniform electric field, force on all particles having same charge is equal.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

8. 

Assertion :In the figure shown, equilibrium of −q charge is stable along y-axis .
Reason : Force on −q at mid point is zero.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** : When a charged particle is released from rest in a region of electric field, its path will represent the electric field lines in the region.
Reason : The force experienced by the charged particle will be along a tangent drawn to the electric field line at a point .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** : A third charge is kept at the centre of the line joining two similar charges Q. The system will be in equilibrium if the third charge is $-\frac{Q}{4}$.
Reason : For a system to be in equilibrium under electrostatic force, the vector sum of forces on each charge due to rest of the charges must be zero.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

ANSWER

1.	(1)	6.	(2)
2.	(4)	7.	(2)
3.	(2)	8.	(2)
4.	(4)	9.	(4)
5.	(4)	10.	(1)

ELECTROSTATICS (FORCE & FIELD)

TRUE & FALSE

Which of the following is **True (T) or False (F)**?

1. a. Charge doesn't depend on speed of reference frame
   b. Charge is a vector quantity
   c. A body can be given any amount of charge
2. a. Upon earthing a positively charged conductor, electrons flow from earth to conductor.
   b. On giving –ve charge to a body, its mass decreases
3. a. Inducting body neither gains nor loses charge.
   b. Net induced charge on an isolated body is zero.
   c. A charged body can not attract an uncharged body
   d. A charged particle can't attract uncharged particle
4. Two identical conductors of copper and aluminium are placed in an identical electric field. The magnitude of induced charge in the aluminium will be less than that in copper.
5. Coulomb force is weaker than gravitational force
6. When charges are shared between any two bodies, no charge is really lost, but some loss of energy does occur.
7. Coulomb's law is valid for all distances.
8. When air is replaced by a dielectric medium of constant k, the maximum force of attraction experienced by two charges separated by a distance increases to k times
9. If three equal and similar charges are placed at corners of an equilateral triangle, the electrostatic force on the charge placed at the center is zero.
10. Let three point charges be placed at the corners of an equilateral triangle. Assuming only electrostatic forces are acting, the system can never be in equilibrium.
11. If a soap bubble is given a negative charge, then its radius decreases.
12. a. Electric field is a vector quantity.
    b. Electric field obeys principle of super position.
13. Relative density of field lines at different points indicates its relative strength at those points
14. The dipole field decreases less rapidly as compared to the field of a point charge.
15. If an electron is moving towards x-axis and the electric field is along y-direction, then path of electron is parabola.
16. If an electron enters in an electric field with its velocity in the direction of the electric lines of force, then velocity of electron will increase.
17. Consider two point charges of equal magnitude and opposite sign separated by a certain distance. Neutral point (where electric field is zero) due to them does not exist.
18. Electric field due to discrete charge configuration is not defined at locations of the discrete charges
19. The torque acting on a dipole of moment $\vec{P}$ in an electric field $\vec{E}$ is $\vec{E} \times \vec{P}$.
20. If an electric dipole is placed in an electric field generated by a point charge, the torque on the dipole due to the field may be zero.

ANSWER

1. (TFF)
2. (TF)
3. (TTFT)
4. (F) (equal to that in copper)
5. (F)
6. (T)
7. (F) (for distances > 10^{-15} m)
8. (F) (decreases by k times)
9. (T)
10. (T)
11. (F) (increases)
12. (TT)
13. (T)
14. (F)
15. (T)
16. (F) (decrease)
17. (T)
18. (T)
19. (F) ($\vec{P} \times \vec{E}$)
20. (T)

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ELECTROSTATICS (POTENTIAL & GAUSS LAW)

ASSERTION & REASON

1. **Assertion** :A spherical shell, a hemispherical shell, and a quarter of a spherical shell, all carrying same amount of charge and of same radii, will have same potential at centre .

   Reason : Potential is a scalar quantity .

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

2. **Assertion** : Two metal spheres of radii R & 2R with charges Q and 2Q are put in contact. The charge flows from sphere of radius 2R towards sphere of radius R.

   Reason : There is loss of electrical energy due to redistribution of charges in a system.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

3. **Assertion** : A point charge is kept on the Gaussian surface. The electric flux through the Gaussian surface is not defined.

   Reason : The electric field at the location of point charge is not defined.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

4. **Assertion** : Gauss's law is applicable for charge distribution of any shape.

   Reason : Gauss's law holds only for inverse square law.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

5. **Assertion** : If a point charge is moved inside a Gaussian surface, flux through Gaussian surface does not change.

   Reason : Flux through Gaussian surface depends on the net charge enclosed by it .

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

6. **Assertion** : Gauss's law can't be used for calculating the electric field due to three equal charges located at the corners of an equilateral triangle.

   Reason : Gauss's law is not valid for this case.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

7. **Assertion** : A charge kept in the cavity of an electrostatic conductor doesn't experiences any force.

Reason : An object kept in the cavity of an conductor is electrostatically shielded from the charges outside the conductor.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Assertion is false

8. **Assertion** : A point charge is kept in front of a neutral conductor. The electric potential in the conductor will be same everywhere.

Reason : A neutral conductor is always at zero potential .

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Assertion is false

9. **Assertion** : A conducting shell contains a point charge 'q' not at its center. Then field at an outside point at a distance 'r' from the center of the shell is kq/r^2.

Reason : A spherically symmetric charge distribution behave like a point charge at the center of distribution for outside points.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Assertion is false

10. **Assertion** : If a metal block is placed near a large uniformly charged non-conducting sheet, it does not experience any net force inspite of induced charges.

Reason : A dipole does not experience any net force in uniform electric field.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Assertion is false

ANSWER

1.	(2)	6.	(3)
2.	(4)	7.	(4)
3.	(4)	8.	(3)
4.	(2)	9.	(2)
5.	(1)	10.	(1)

ELECTROSTATICS (POTENTIAL & GAUSS LAW)

(TRUE/FALSE)

Which of the following is **True (T) or False (F)**?

Gauss Law and Flux

1. Number of field lines crossing a given area is constant, whatever its distance from the charge.
2. Total electric flux coming out of a unit positive charge placed in air is ε_0^{-1}
3. For a given surface the Gauss's law is stated as $\oint E.ds = 0$. From this we can conclude that E is necessarily zero on the surface
4. If an electric dipole is placed in north-south direction in a sphere filled with water, electric flux entering into and leaving sphere are different.

Potential

5. a. 1 volt = 300 stat volt.
   b. Potential can be defined if electrostatic field is conservative.
   c. Electric potential determines the direction of flow of charge.
6. A positive charge if left free in electric field always moves from higher potential to lower potential while a negative charge moves from lower potential to higher potential.
7. An electric potential can exist at a point in a region where electric field is zero and it's vice versa.
8. Potential due to a charge Q at its own location is undefined.
9. A conductor with a positive charge is always at positive potential.
10. Angle between equipotential surface and lines of force is zero.
11. Consider the points lying on a straight line joining two fixed opposite charges. Between the charges there is no point where electric field is zero and only one point where potential is zero.
12. Let two conducting spheres of radius 'a' and 'b' respectively be charged and joined by a wire. Then ratio of electric field of spheres is b : a.
13. If two metal spheres of radii 'a' and 'b' are charged to the same potential, then ratio of charges on the spheres is $a^2 : b^2$.
14. If an electron enters in high potential region from lower potential region, then its velocity will decrease.
15. When one electron is taken close to another electron, then the electric potential energy of the system decreases.
16. Equipotential surfaces associated with a uniform electric field along the x-direction $\vec{E}$ are planes parallel to xy-plane
17. At a point in space, the electric field points towards north. In the region, surrounding this point the rate of change of potential will be zero along the east and west.
18. Potential at a point due to an electric dipole will be maximum and minimum when angles between dipole moment and position vector of the point from centre of dipole are respectively 0° and 180°.

Conductors

19. Outside a hollow charged spherical conductor, the potential falls with distance.
20. If an isolated solid metallic sphere is given positive charge, charge will be distributed on the sphere uniformly but only on surface.
21. If a point charge is kept at the centre of a metallic insulated spherical shell, then net induced charge on the sphere is zero.
22. There are two metallic spheres of same radii but one is solid and the other is hollow, then solid sphere can be given more charge.
23. The electric field inside a spherical shell of uniform surface charge density is zero.
24. A metallic shield in form of a hollow shell may be built to block an electric field.
25. If a charge is given to a solid piece of metal, the charge will distribute itself such that potential energy of system is minimised.

ELECTROSTATICS (POTENTIAL & GAUSS LAW)

TRUE/FALSE

ANSWER

1. (F)
2. (T)
3. (F) (total flux through surface is zero)
4. (F) (same)
5. (FTT)
6. (T)
7. (T)
8. (T)
9. (F) (may be at + ve, zero or – ve potential)
10. (F) (90^o)
11. (T)
12. (T)
13. (F) (a : b)
14. (F) (increase)
15. (F) (increases)
16. (F) (planes parallel to yz-plane)
17. (T)
18. (T)
19. (F) (may increase or decrease)
20. (T)
21. (T)
22. (F) (they can be charged equally)
23. (T)
24. (T)
25. (T)

ELECTROSTATICS (CAPACITANCE)

ASSERTION & REASON

1. **Assertion** : When charges are shared between two parallel plate capacitors, charge of system is conserved but some energy is lost.
   Reason : During sharing of charges, some energy is dissipated as heat.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

2. **Assertion** : One farad is a very large unit of capacitance.
   Reason : Capacity of the Earth is 711 μF.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

3. **Assertion** : Capacitance of capacitors increases when dielectric medium is placed between the plates of the capacitor.
   Reason : Electric field in the capacitor decreases on inserting a dielectric medium.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

4. **Assertion** : If seperation is increased between the plates of isolated charged capacitor, the electric field remain same.
   Reason : In an isolated charged capacitor, the charge remains constant.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

5. **Assertion** : If charge on a capacitor is increased, the force on a plate of the capacitor also increases.
   Reason : The field between the plates of a capacitor increases if the charge is increased.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

6. **Assertion** : If two uncharged capacitors are connected in series across a battery, then energies stored in them are in inverse ratio of their capacities.
   Reason : Energy of capacitor, $U = \frac{1}{2} QV$.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

7. **Assertion** : When a dielectric slab is inserted slowly in an isolated charged capacitor, the stored electrostatic energy decreases.
   Reason :The work done by electric field, when a dielectric slab is inserted in an isolated charged capacitor, is positive .
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

8. **Assertion** : A dielectric slab covers half of the area in a parallel plate capacitor. The charge on each plate is uniformly distributed.
Reason : Each plate of the capacitor has same potential everywhere on the surface .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** :If two different capacitors having same charge are connected in parallel, then loss of energy will be zero .
Reason : In this case, there is no redistribution of charge.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** :On inserting a dielectric slab in a capacitor connected to a battery, the slab is pulled in .
Reason : Charge on the capacitor is increasing in this case.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

ANSWER

1.	(2)	6.	(2)
2.	(2)	7.	(1)
3.	(1)	8.	(4)
4.	(2)	9.	(4)
5.	(1)	10.	(2)

ELECTROSTATICS (CAPACITANCE)
TRUE & FALSE

Which of the following is **True (T) or False (F)**?

Capacitance

1. a. A capacitor is so configured that it confines the field lines with in a small region.
   b. Unlimited amount of charge can be stored on a capacitor without significant leaking.
2. In air, if intensity of electric field exceeds the value 3×10^6 N/C, air ionizes.
3. With rise in temperature dielectric constant of liquid increases.
4. Radial and non-uniform electric field exists between the spherical surfaces of spherical capacitor.
5. A capacitor stores charge in electrostatic field between plates.
6. Capacitance of a parallel plate capacitor does not depend upon charge given, potential raised, nature of metals and thickness of plates.
7. Spherical conductor is equivalent to a spherical capacitor with it's outer sphere of infinite radius.
8. If E is the electric field intensity of an electrostatic field, then the electrostatic energy density is proportional to E
9. When air in a capacitor is replaced by a medium of dielectric constant K, capacity decreases K times
10. A metal can be used as a medium for dielectric.
11. If one plate of parallel plate capacitor is smaller than other, then charge on smaller plate will be equal to other.
12. A parallel plate capacitor is charged and the charging battery is then disconnected. If the plates of the capacitor are moved further apart by means of insulating handles, then electrostatic energy stored in the capacitor increases.
13. A parallel plate capacitor is first charged and then disconnected. A dielectric slab is introduced between the plates. The quantity that remains unchanged is charge Q.
14. When we touch the terminals of a high voltage capacitor, even after a high voltage has been cut off, then the capacitor has a tendency to discharge energy and can be dangerous.
15. If distance between parallel plates of a capacitor is halved and dielectric constant is doubled then capacitance increases two times
16. Two capacitors of capacities C_1 and C_2 are charged to voltages V_1 and V_2 respectively. There will be no exchange of energy in connecting them in parallel, if $C_1 = C_2$.
17. The capacities of two conductors are C_1 and C_2 and their respective potentials are V_1 and V_2. If they are connected by a thin wire, then the loss of energy will be given by $\frac{C_1C_2(V_1 - V_2)^2}{2(C_1 + C_2)}$
18. Three identical capacitors are combined differently. For same voltage to each combination, one that stores greatest energy is three in parallel.
19. Charge of a capacitor leaks due to reduction in insulating power of intervening medium.
20. Polar molecule has no permanent dipole moment.

ANSWER

1. (TF)
2. (T)
3. (F) (decreases)
4. (T)
5. (F) (It stores electric energy)
6. (T)
7. (T)
8. (F) (E^2)
9. (F) (increases K times)
10. (F) (can not be)
11. (T)
12. (T)
13. (T)
14. (T)
15. (F) (increases 4 times)
16. (F) ($V_1 = V_2$)
17. (T)
18. (T)
19. (T)
20. (F)

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CURRENT ELECTRICITY
(ASSERTION & REASON)

1. **Assertion** : Electrolytes are less conducting than metals.
Reason : Ions in an electrolyte move slower then electrons in a conductor.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

2. **Assertion** : The direction of current through a battery is always from negative terminal to positive terminal.
Reason : Outside a battery, the current flows from positive terminal to negative terminal.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

3. **Assertion** :Terminal potential difference of a cell is always less than its emf .
Reason : Potential drop in internal resistance of the cell decreases the terminal voltage.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

4. **Assertion** : Potentiometer is preferred over voltmeter for measuring emf of a cell.
Reason : Potentiometer does not draw current from the cell whose emf is to be measured at the balance point.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

5. **Assertion** : A potentiometer wire of longer length should be used for more accurate measurements.
Reason : The potential gradient for a potentiometer of longer length with given source of emf becomes smaller.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

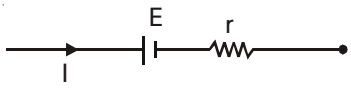
6. **Assertion** : To determine an unknown resistance with a meter bridge, unknown resistance is put in right gap first and then in left gap. Average value of the observations is taken as value of unknown resistance.
Reason : In any experiment, when average value of observations is taken, random error is minimised .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

7. **Assertion** : Out of galvanometer, ammeter and voltmeter, resistance of ammeter is lowest and resistance of voltmeter is highest.
Reason : An ammeter is connected in series and voltmeter in parallel in a circuit.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

8. **Assertion** : Two bulbs rated to operate at voltage V are connected in series across the voltage V. The bulb with lower power rating glows more brightly.
Reason : Current flowing in the bulb with lesser power rating in the series arrangement is more.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** :A battery generates maximum power when it is short-circuited .
Reason : Maximum current flows through the battery when it is short circuited .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** : Though the same current flows through the connecting wire and filament of a bulb, heat produced in the filament is much higher than that in the connecting wires.
Reason : The filament of bulbs is made of a material of high resistance and high melting point.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

11. **Assertion** : 

When a current I is passing through a cell of emf E and internal resistance r as shown in figure, the cell stores chemical energy at a rate of $(EI-I^2r)$.
Reason : When a current I flows in a cell, energy dissipated in the cell is I^2r due to its internal resistance.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

12. **Assertion** : In a current carrying wire of non uniform area of cross-section, heat produced per unit volume at different crossections are different.
Reason : The current crossing each crossection of the wire is same.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

13. **Assertion** : When an external resistor of resistance R connected across a cell of internal resistance 'r' is varied, power consumed by resistance R is maximum when $R = r$.
Reason : Power consumed by a resistor of constant resistance R is more when current through it is more.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

Answer

1.	(1)	8.	(3)
2.	(4)	9.	(1)
3.	(4)	10.	(1)
4.	(1)	11.	(4)
5.	(1)	12.	(2)
6.	(2)	13.	(2)
7.	(2)		

CURRENT ELECTRICITY

TRUE/FALSE

Which of the following is **True (T) or False (F)**?

1. There is no current in the metals in the absence of electric field because motion of a free electron is random.
2. The drift velocity of electrons in a metallic wire will increase, if the temperature of the wire is increased.
3. The electric bulbs glows immediately when switch is turned on because the drift velocity of electrons in a metallic wire is very high.
4. Ohm's law is true for metallic conductors at low temperature.
5. A conducting material does not obey Ohm's law only if resistivity of material depends on magnitude & direction of applied electric field.
6. In case of conductors, drift velocity does not vary on increasing the intensity of electric field.
7. Copper is not widely used in wire-bound standard resistors since its resistance value changes a lot with temperature.
8. In a conductor, resistance as well as resistivity depend on both its material and dimensions.
9. Materials of commercially produced resistors for domestic use or in laboratories are relatively insensitive to temperature.
10. Resistivity of a semiconductor increases with increasing temperature.
11. The atoms of a conductor vibrate with larger amplitude at higher temperatures thereby increasing its resistivity.
12. If a steady current flows in a metallic conductor of non-uniform cross-section, quantity that remains constant along the conductor is current density.
13. Using n conductors of equal resistance, the number of possible combinations is 2^n.
14. If resistance of n conductors are totally different, then number of possible combinations will be 2^n.
15. If a wire of resistance R is cut in n equal parts and these parts are collected to form a bundle, then equivalent resistance of combination will be $\frac{R}{n}$.
16. Electromotive force of the cell is not a force but is the potential difference between the positive and negative electrodes in an open circuit.
17. Internal resistances of cells in the circuit may be neglected when the current I is such that $\varepsilon << Ir$.
18. The internal resistance of dry cells is much higher than the common electrolytic cells.
19. In a series grouping of identical cells if one cell is wrongly connected, then it will cancel out the effect of that cell only.
20. The current in a circuit will be maximum when power consumed by the load is maximum.
21. Wheatstone bridge is most sensitive if all the arms of bridge have equal resistances.
22. The measurement of resistance by Wheatstone bridge is affected by internal resistance of the cell.
23. In meter bridge or Wheatstone bridge for measurement of resistance, the known and the unknown resistances are interchanged. The error so removed is end correction.
24. In case of zero deflection in the galvanometer, current flows in the primary circuit of the potentiometer, not in the galvanometer circuit.
25. In meter bridge experiment, a low resistance is always connected in series with a galvanometer.
26. The e.m.f. of the driver cell in the potentiometer experiment should be greater than the e.m.f. of the cell to be determined.
27. To reduce power dissipated by the transmission cables from power stations which are hundereds of miles long, current may be carried at low values of V.
28. Electric appliances with metallic body have three connections to ensure that the appliance is earthed.
29. The resistance of an incandescent lamp is greater when switched on.
30. Kirchhoff's loop rule is based on the law of conservation of energy.
31. The terminal potential difference of a cell is greater than its e.m.f. when it is being discharged.
32. When identical cells are connected in parallel, then the e.m.f. increases.
33. Two non-ideal identical batteries are connected in parallel. The equivalent internal resistance is smaller than either of the two internal resistances.
34. If in the experiment of Wheatstone's bridge, the positions of cells and galvanometer are interchanged, then balance condition will change.
35. An ideal voltmeter should have infinite resistance and an ideal ammeter should have zero resistance.

ANSWERS

1. (T)
2. (F – decrease)
3. (F)
4. (T)
5. (T)
6. (F – increases)
7. (T)
8. (F-resistivity independent of dimensions)
9. (T)
10. (F,decreases)
11. (T)
12. (F-Current)
13. (F-2^{n-1})
14. (T)
15. (F) ($\frac{R}{n^2}$)
16. (T)
17. (F) ($e >> Ir$)
18. (T)
19. (F-two cells)
20. (F-external resistance is zero)
21. (T)
22. (F-not affected)
23. (T)
24. (T)
25. (F-high resistance)
26. (T)
27. (F-enormous values of V)
28. (T)
29. (T)
30. (T)
31. (F – being charged)
32. (F – remains same)
33. (T)
34. (F – remain unchanged)
35. (T)

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MAGNETIC EFFECT OF CURRENT

ASSERTION & REASON

1. **Assertion** : Magnetic field of a long straight current carrying wire is inversly proportional to distance from the axis of wire.
   Reason : Electric field of a long straight uniformly charged wire is inversly proportional to distance from the axis of wire.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
2. **Assertion** : Magnetic field inside a long straight solenoid carrying current is practically uniform.
   Reason : There is no magnetic field ouside a long straight solenoid carrying current.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
3. **Assertion** : An amperian loop for applying Ampere's law must be conducting.
   Reason : Only conductors can carry current and thus produce magnetic field.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
4. **Assertion** : The amperian loop cannot pass through the current carrying conductor.
   Reason : The magnetic field at the axis of a current carrying conductor is infinite.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
5. **Assertion** : When a charged particle enters into a region of uniform magnetic field, de–Broglie wavelength associated with it will not change.
   Reason : The magnetic force cannot cause a change in momentum of the charged particle.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
6. **Assertion** : An electron is projected with uniform velocity along the axis of a current carrying long solenoid. The electron will continue to move with uniform velocity along the axis of the solenoid.
   Reason : Magnetic field inside the solenoid is uniform.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
7. **Assertion** : A charged particle is projected horizontally on a horizontal rough surface, where a uniform magnetic field is present in vertical direction. The path of the particle will be a spiral.
   Reason : The particle loses energy continously due to friction.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

8. **Assertion** :An electron projected directly towards a current carrying wire will follow a circular path .
Reason : The velocity of the electron is perpendicular to the direction of magnetic field of the wire .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** :In a cyclotron, a charged particle undergoes acceleration all the time .
Reason : The charged particle speeds up inside the dees due to magnetic field and between the dees due to electric field.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** : In a moving coil galvanometer, if current is doubled, deflection will also get doubled in general.
Reason : The restoring torque is directly proportional to twist.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

11. **Assertion** : Two parallel wires carrying currents in the same direction attract each other.
Reason : There is an electrostatic attraction between electrons in one wire and nuclei in the other.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

12. **Assertion** : A proton beam will attract an electron beam moving parallel to it in the opposite direction.
Reason : Conventional current is opposite to flow of electrons .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

13. **Assertion** : A solenoid tends to contract when a current passes through it.
Reason : Two parallel metallic wires carrying current always attract each other .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

Answer

1.	(2)	8.	(4)
2.	(3)	9.	(3)
3.	(4)	10.	(2)
4.	(4)	11.	(2)
5.	(3)	12.	(2)
6.	(2)	13.	(3)
7.	(1)		

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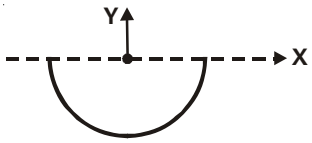
MAGNETIC EFFECT OF CURRENT

TRUE/FALSE

Which of the following is **True or False**?

1. The strength of the magnetic field at a point distant 'r' from the axis of a long straight current carrying wire is B. The field at a distance $\frac{r}{2}$ will be 4B.
2. The value of magnetic field induction at a point, on the centre of separation of two linear parallel conductors carrying equal currents in the same direction is zero.
3. If a current carrying circular loop of one turn is turned into a coil having 'n' turns, then magnetic field at the centre of the coil becomes n times the previous field.
4. A circular coil of radius R carries an electric current. The magnetic field due to the coil at a point on the axis of the coil located at a distance r from the centre of the coil, such that $r >> R$, varies as $\frac{1}{r^3}$.
5. 

A current I flows in a long straight wire with cross section having the form of half circular ring of radius R. Magnetic field induction at the point O is along $+$ve Y-direction.
6. In electric circuits, wires carrying currents in opposite directions are often twisted together so that magnetic field gets cancelled out.
7. If current flows in a conductor from east to west, the direction of magnetic field at a point above the conductor is towards south.
8. If a copper rod carries a direct current, the magnetic field associated with the current will be outside the rod and not inside the rod.
9. A charged particle moving in a magnetic field experiences a resultant force in the direction perpendicular to both the field and its velocity
10. If the direction of the initial velocity of the charged particle is neither along nor perpendicular to that of the magnetic field, then the orbit will be a helix.
11. Let a strong magnetic field be applied on a stationary electron. Then electron moves in the direction of the field.
12. An electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along south.
13. A magnetic field exerts a force, if the charged particle is moving across the magnetic field lines.
14. There is no change in the kinetic energy of a charged particle moving in a magnetic field although a magnetic force may be acting on it
15. Magnetic force does no work when the charged particle is displaced while electric force does work in displacing the charged particle.
16. For a charged particle describing uniform circular motion in a magnetic field $T^2 \propto r^3$.
17. An electron and a proton enter a magnetic field perpendicularly. If both have same kinetic energy, trajectory of electron is less curved
18. In a cyclotron electric field increases K.E. while magnetic field changes direction of moving charge particle.
19. A rectangular current loop is in an arbitrary orientation in an external uniform magnetic field. No work is required to rotate the loop about an axis perpendicular to its plane.
20. A current carrying rectangular coil is placed in a uniform magnetic field. The coil will not tend to rotate if magnetic field is parallel to plane of coil.
21. A conducting spring is suspended just touching a dish of mercury. When a current is passed through the spring, the spring executes oscillatory motion in the vertical direction.
22. The current sensitivity of a moving coil galvanometer can be increased by increasing the magnetic field of the permanent magnet, area and number of turns of the deflecting coil.
23. A beam of electrons and protons move parallel to each other in the same direction, then they attract each other magnetically.
24. The shape of magnet, in moving coil galvanometer to make the magnetic field radial, is convex.
25. Free electron always keep on moving in a conductor. Even then no net magnetic force acts on the conductor in a magnetic field if no current is flowing through it because the average velocity of free electron is zero.

ANSWER

1.	F	(2B)	14.	T	
2.	T		15.	T	
3.	F	(n^2 times)	16.	F	
4.	T		17.	F	(more)
5.	F		18.	T	
6.	T		19.	T	
7.	F	(north)	20.	F	(perpendicular)
8.	F	(both inside and outside the rod)	21.	T	
9.	T		22.	T	
10.	T		23.	F	(repel magnetically but attract electrically)
11.	F	(remains stationary)	24.	F	(concave)
12.	T		25.	T	
13.	T				

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MAGNETISM
ASSERTION & REASON

1. **Assertion** : Magnetic lines of force always form closed loops.
   Reason : Magnetic monopole does not exist i.e. poles always exist in pair .
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

2. **Assertion** : Iron filings are attracted strongly by the poles of a magnet.
   Reason : Magnetic field around poles of a magnet is strong.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

3. **Assertion** : When a bar magnet is placed horizontally along east -west direction, no neutral points are obtained.
   Reason : Neutral points can be obtained only if a bar magnet is placed along north-south direction.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

4. **Assertion** : A compass needle does not align in any particular direction on the magnetic north pole of the Earth.
   Reason : The Earth has only horizontal component of its magnetic field at the north poles .
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

5. **Assertion** : Time period of vibration of a pair of magnets in sum position is always smaller than in difference position.
   Reason : Both dipole moment and moment of inertia become larger in the sum position as compared to the difference position.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

6. **Assertion** : Dip circle shows a dip greater than true dip when placed in a plane other than magnetic meridian.
   Reason : Horizontal component of earth's field is most effective when Dip circle is placed in the magnetic meridian.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

7. **Assertion** : Diamagnetic effects are present in all materials.
   Reason : Some magnetic dipole moment develops in each atom opposite to external field when external field is switched on.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

8. **Assertion** : Elements having paired electrons are diamagnetic.
Reason : Para and diamagnetic effects cancel each other in these materials.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** : Susceptibility vs absolute temperature graph for a diamagnetic material is a straight line parallel to temperature axis.
Reason : Susceptibility of a magnetic material is not affected by temperature.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** : When a ferromagnetic material is placed in an external magnetic field, the magnetic domains always increase in size.
Reason : Atomic dipoles in magnetic domains of ferromagnetic substance tend to align themselves parallel to the direction of external magnetic field .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

11. **Assertion** : The ferromagnetic substances do not obey Curie's law.
Reason : At Curie point, a ferromagnetic substance starts behaving as a paramagnetic substance.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

12. **Assertion** : To protect any instrument from external magnetic field, it is put inside an iron container.
Reason : Iron is a magnetic substance.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

13. **Assertion** : When a ferromagnetic material goes through hysterisis loop, the slope of B-H curve may be negative.
Reason : Hysteresis loop is meanigful for ferromagnetic substances only.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

Answer

1.	(1)	8.	(3)
2.	(2)	9.	(3)
3.	(4)	10.	(4)
4.	(3)	11.	(2)
5.	(3)	12.	(2)
6.	(1)	13.	(4)
7.	(1)		

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MAGNETISM
TRUE/FALSE

Which of the following is **True (T) or False (F)**?

1. Magnetic moment of
   a. straight current carrying wire is zero.
   b. toroid is zero.
   c. atoms having paired electrons is zero.
2. Let a magnetic needle be vibrating in earth's magnetic field. If temperature is raised, time period increases upto Curie's temperature (770°C) after which it stops vibrating.
3. We cannot think of magnetic field configuration with three poles.
4. Magnetic moment of an atom is due to both, the orbital motion and spin motion of every electron.
5. Coercivity of soft iron is small.
6. Intensity of magnetic field due to earth at a point inside a hollow steel box is same as that outside.
7. The permeability of a ferromagnetic material is independent of the magnetic field.
8. Gauss theorem $\oint \vec{B}.d\vec{S} = 0$ in magnetism is a statement of the fact that magnetic monopole does not exist.
9. For making permanent magnets, steel is preferred over soft iron because coercivity of steel is larger.
10. The magnet can be completely demagnetized by heating it slightly.
11. There is no couple acting when two bar magnets are placed coaxially separated by a distance because the forces act along the same line.
12. The magnetic lines of force inside a bar magnet are from south pole to north pole of the magnet.
13. A dip needle in a plane perpendicular to magnetic meridian will remain horizontal.
14. Angle of dip at the
    a. magnetic equator is 0°.
    b. magnetic poles is 90°
15. Lines on the earth's surface joining the points where
    a. declination is same are called isogonic lines.
    b. dip is same are called isoclinic lines.
    c. horizontal component of field is same are called isodynamic lines.
    d. dip is zero is called aclinic line.
16. A bar magnet is placed north-south with its north pole due north. The neutral points will be on the axis of the magnet.
17. Keeping dissimilar poles of two magnets of equal pole strength and length same side, their time period will be infinite.
18. A superconductor exhibits perfect diamagnetism.
19. A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as paramagnetic.
20. Magnetic susceptibility of any paramagnetic material changes inversely with absolute temperature.
21. Ferromagnetism arises due to
    (i) displacement of boundaries of domain.
    (ii) rotation of domain.
22. $B \times H$ has dimension of energy density.
23. In B-H hystersis curve
    a. Retentivity is value of B when H is zero.
    b. Coercivity is value of H when B is zero.
24. At neutral points $\vec{B}_{earth} + \vec{B}_{magnet} = \vec{0}$
25. In paramagnetic materials an atom has a net dipole moment but bulk material has zero net dipole moment in absence of an external magnetic field.

Answer

1. TTT
2. T
3. F
4. T
5. T
6. F (zero inside)
7. F
8. T
9. T
10. F **(a reverse field)**
11. T
12. T
13. F (vertical)
14. .TT
15. TTTT
16. F (equatorial)
17. T
18. T
19. F **(diamagnetic)**
20. T
21. TT
22. T
23. TT
24. F **(net horizontal field zero)**
25. T

SOLUITON
(ASSERTION & REASON/ STATEMENTS)

1. **Assertion** : Freezing point of solution of 1M benzoic acid in water and benzene is different.

   Reason : Cryoscopic constant of water and benzene is different.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

2. **Assertion** : The elevation in boiling points of equimolar solution of HCl and CH_3COOH is same.

   Reason : The extent of dissociation of HCl is more than CH_3COOH.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Assertion is true statement but Reason is false

   (3) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (4) Assertion is false

3. **Assertion** : The freezing point of a solution containing a non-volatile solute is always lower than that of pure solvent.

   Reason : Depression in freezing point is a colligative property.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

4. **Assertion** : The process of mixing methanol and benzene is accompanied by increase in enthalpy.

   Reason : On mixing, stronger forces of attraction of methanol is replaced by weak forces of attraction.

   (1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (2) Assertion is true statement but Reason is false

   (3) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (4) Assertion is false

5. **Assertion** : The vapour pressure of 0.1M urea solution is more than that of 0.1M NaCl solution.

   Reason : Relative lowering of vapour pressure is directly proportional to the number of species present in the solution.

   (1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (2) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

6. **Assertion** : The 0.5 M aqueous solution of NaCl and 2M Benzoic acid in Benzene at the same temperature exert equal osmotic pressure.

   Reason : Benzoic acid ionises in benzene.

   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

   (3) Assertion is true statement but Reason is false

   (4) Assertion is false

7. **Statement-I** : Higher the value of molal depression constant of solvent, used to prepare solution, lower will be the freezing point of solution.
Statement-II : Depression in freezing point also depends upon nature of solvent.
(1) Both statement-I and statement-II are incorrect
(2) Both statement-I and statement-II are correct
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

8. **Assertion** : 6g urea and 18g glucose dissolved in same amount of water will produce same osmotic pressure at same temperature.
Reason : Osmotic pressure is colligative property.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** : 1 M solution of NaCl has higher freezing point than 1M solution of $CaCl_2$.
Reason : Freezing point is colligative property.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Assertion is true statement but Reason is false
(3) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(4) Assertion is false

10. **Assertion** : For a solution having equal mole fraction of both volatile components, P^0_A and P^0_B are 720 mm of Hg and 420 mm of Hg respectively, for such solution $\frac{Y_A}{Y_B} > \frac{X_A}{X_B}$.
Reason : The vapour pressure of binary solution is equal to the sum of the vapour pressure of both volatile components in the pure state.
(1) Assertion is true statement but Reason is false
(2) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(3) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(4) Assertion is false

11. **Statement-I** : An azeotropic liquid mixture is one that boils with unchanged composition.
Statement-II : The vapour pressure of a liquid decreases upon dissolution of a non-volatile Solute.
(1) Both statement-I and statement-II are correct
(2) Statement-I is correct but statement-II is incorrect
(3) Both statement-I and statement-II are incorrect
(4) Statement-I is incorrect but statement-II is correct

12. **Statement-I** : Molecular mass of proteins should not be calculated using elevation in boiling point or depression in freezing point method.
Statement-II : Polymers solutions do not possess a constant boiling point or freezing point.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

13. **Statement-I** : The molecular weight of acetic acid determined by depression in freezing point method in benzene and water was found to be different.
Statement-II : Benzene is dimerised in benzene but not in water.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

14. **Statement-I** : Reverse osmosis is used to purify saline water.
Statement-II : By applying higher pressure than osmotic pressure the solvent molecule pass from concentrated to dilute solution through semi-permeable membrane.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

15. **Statement-I** : Mole fraction of a component of the given solution does not change with temperature.
Statement-II : The expression involves only mass of the components, which remain unaffected with changing temperature.
(1) Both statement-I and statement-II are incorrect
(2) Both statement-I and statement-II are correct
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

16. **Statement-I** : The freezing point of water is decreased by the addition of glucose.
Statement-II : Entropy of solution is less than entropy of pure solvent.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

17. **Statement-I** : For dilute aqueous solutions , molality = molarity.
Statement-II : Molality is defined as the number of moles of solute dissolved per litre of solution.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

Answer

1.	(2)	7.	(2)	13.	(1)
2.	(4)	8.	(1)	14.	(1)
3.	(2)	9.	(2)	15.	(2)
4.	(3)	10.	(1)	16.	(3)
5.	(2)	11.	(1)	17.	(3)
6.	(3)	12.	(3)		

SOLUITON
(TRUE & FALSE)

1. If two components are mixed to form ideal solution then $\Delta S_{mix} = 0$.
2. The solution showing positive deviation possess $\Delta G_{mix} > 0$.
3. In case of ionic compounds term formality is used instead of molarity.
4. Mole fraction and mass percentage are unit less quantities.
5. Colligative properties depends only on nature of solute and number of solvent particles.
6. Osmotic pressure is directly proportional to absolute temperature when concentration remains the same.
7. Osmotic pressure of all equimolar solutions are equal at the same temperature.
8. Boiling point of azeotropic mixture is always higher than boiling point of its both components.
9. The depression in freezing point of 0.1 M aq. solution of HCl, $CuSO_4$ and K_2SO_4 are in the ratio of 1 : 1:1.5.
10. A plant cells swells when placed in hypertonic solution.
11. $\frac{iw_1}{M_1 \times V_1} = \frac{iw_2}{M_2 \times V_2}$ is a relationship for isotonic solutions.
12. Osmotic pressure is the best property which is used to determine the molecular mass of polymers.
13. Henry's law is not valid for dissolution of HCl in water.
14. Osmosis and diffusion are same in solution.
15. The value of van't Hoff factor is more than one in dissociation and less than one in association.
16. On mixing chloroform and acetone, formation of intermolecular hydrogen bond takes place.
17. Wilted flowers revive when placed in fresh water due to osmosis.
18. Cellulose acetate memberane is used in desalination plants.
19. If RBCs are removed from body and placed in pure water, pressure inside the cells increases.
20. For a gas dissolved in water, Henry's constant (K_H) increase with increase of temperature.
21. Vapour pressure of an aqueous solution of sucrose is less than 1.013 bar at 373.15K.

Answers

1. (F) ΔS_{mix} = positive
2. (F) ΔG_{mix} = negative
3. (T)
4. (T)
5. (F)
6. (T)
7. (F) i may be different
8. (F) only maximum boiling azeotropes
9. (T)
10. (F) Shrinks
11. (T)
12. (T)
13. (T)
14. (F)
15. (T)
16. (T)
17. (T)
18. (T)
19. (T)
20. (T)
21. (T)

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SOLID STATE
(ASSERTION & REASON/ STATEMENTS)

1. **Statement-I** : Due to Frenkel defect, there is no effect on the density of crystalline solid.
Statement-II : In Frenkel defect, no cation or anion leaves the crystal.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

2. **Statement-I** : The effective number of octahedral voids in ccp structures is 4 per unit cell.
Statement-II : In the ccp structure, there is one octahedral void in the centre of the body and 12 octahedral voids on the 12 edges of the cube and each of these edge based void is shared by four unit cells.
(1) Statement-I is incorrect but statement-II is correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Both statement-I and statement-II are correct

3. **Statement-I** : Heating the alkali halide crystals with alkali metal vapour produces anion vacancies in alkali halides.
Statement-II : Electrons trapped in anion vacancies are referred as F-centres.
(1) Both statement-I and statement-II are correct
(2) Statement-I is correct but statement-II is incorrect
(3) Both statement-I and statement-II are incorrect
(4) Statement-I is incorrect but statement-II is correct

4. **Statement-I** : Electrical conductivity of semiconductors increases with increasing temperature.
Statement-II : With increase in temperature, large number of electrons from the valence band can jump to the conduction band.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

5. **Statement-I** : The presence of a large number of Schottky defect in NaCl lowers its density.
Statement-II : In NaCl, there are approximately 10^6 Schottky pairs per cm^3 at room temperature.
(1) Both statement-I and statement-II are incorrect
(2) Both statement-I and statement-II are correct
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

6. **Statement-I** : Octahedral holes are present at edge centre and at body center in FCC arrangement.
Statement-II : Contribution of holes (octahedral) at edge centre is $\frac{1}{4}$ and that at body centre is 1.
(1) Both statement-I and statement-II are correct
(2) Statement-I is incorrect but statement-II is correct
(3) Statement-I is correct but statement-II is incorrect
(4) Both statement-I and statement-II are incorrect

7. **Statement-I** : Due to Schottky defect, there is no effect on the density of the crystalline solid.
Statement-II : In Schottky defect, no cation or anion leaves the crystal.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

8. **Statement-I** : In close packing of spheres, a tetrahedral void is surrounded by four spheres where as octahedral void is surrounded by six spheres.
Statement-II : A tetrahedral void has a tetrahedral shape whereas octahedral void has an octahedral shape.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

9. **Statement-I** : The close packing fraction of atoms in cubic structure is in the order FCC > BCC > SC.
Statement-II : Packing fraction: volume of the atoms occupying unit cell /vol. of unit cell.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

10. **Assertion** : w.r.t. each corner atom in FCC arrangement, there are 4 nearest neighbours in each plane.
Reason : FCC is highly efficient packing.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

11. **Assertion** : Fe_3O_4 is ferromagnetic at room temperature but becomes paramagnetic at 850 K.
Reason : The magnetic moments in Fe_3O_4 are aligned equally in parallel & antiparallel directions, which on heating randomises.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

12. **Assertion** : In actual NaCl crystal, each Na^+ is touching $6Cl^-$ ions but the Cl^- ions do not touch each other.
Reason : The radius ratio $r_{Na^+}/r_{\bar{Cl}} = 0.504$, which is greater than exact fitting ratio.
(1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(2) Assertion is true statement but Reason is false
(3) Assertion is false
(4) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

13. **Assertion** : The two ions A^+ and B^- have radii 88 and 200 pm respectively. Coordination number of A^+ will be 6.
Reason : When $r_+/r_- = 0.414 - 0.732$, the coordination number is 6.
(1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(2) Assertion is true statement but Reason is false
(3) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(4) Assertion is false

14. **Assertion :** In crystal lattice the size of the cation is larger in octahedral hole than in tetrahedral hole.
Reason : Cations always occupy voids in crystal packing of ionic solids.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

15. **Assertion :** NaCl crystal unit cell has fcc arrangement.
Reason : There are 4 units of NaCl present per unit cell.
(1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(2) Assertion is true statement but Reason is false
(3) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(4) Assertion is false

16. Tetrahedral voids can be located on face diagonals.

17. Density of unit cell is given by $= \frac{Z \times M}{a^3}$ (Here M is molar mass).

18. In ZnS, Zn^{2+} occupy alternate tetrahedral voids.

19. AgBr shows both schottky & frenkel defects.

20. When crystals of NaCl are heated in an atmosphere of sodium vapour, they turn yellow due to excess of Cl^- in the crystal.

21. In fcc packing, if each unit cell is divided into eight small cubes, then there is an octahedral void at the centre of each small cube.

22. In CsCl structure the nearest neighbours of Cs^+ are 8 Cs^+ ions.

23. 6 : 6 co-ordination changes to 8 : 8 co-ordination on applying pressure.

24. If $K_2[PtCl_6]$ adopts antiflourite structure, then $[PtCl_6]^{2-}$ ions adopt fcc arrangement.

25. White zinc oxide turns yellow on heating and its formula becomes $Zn_{1+x}O$.

Answers

1.	(1)	10.	(2)	19.	(T)
2.	(3)	11.	(1)	20.	(F)
3.	(1)	12.	(4)	21.	(F)
4.	(1)	13.	(3)	22.	(T)
5.	(2)	14.	(3)	23.	(T)
6.	(1)	15.	(3)	24.	(T)
7.	(2)	16.	(F)	25.	(T)
8.	(3)	17.	(F)		
9.	(1)	18.	(T)		

EXTRACTION
(ASSERTION / REASON TYPE QUESTIONS)

1. **Assertion :** Carbon is not used for the reduction of Al_2O_3.
Reason : Al_2O_3 is a stable oxide with a highly –ve ΔG_F^o.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

2. **Assertion :** In metallurgy, reduction of metal oxide is easier if the metal formed is in liquid state at the temperature of reduction.
Reason : ΔS for reduction process is more negative when the metal formed is in liquid state.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

3. **Assertion :** In leaching of bauxite containing Fe_2O_3 as impurity KOH or HNO_3 can be used as leaching agent.
Reason : Al_2O_3 is amphoteric and reacts with acid or base both.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

4. **Assertion :** The concentration of sulphide area by froath floatation is based on emulsification.
Reason : Pine oil in water forms emulsion.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

5. **Assertion :** Ethyl xanthate is used as a collector in froth floatation process.
Reason : Collectors depress the floatation property of one of the components of the ore and thus help in the separation of different minerals present in the same ore.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

6. **Assertion :** In smelting, the roasted ore is heated with powdered coke in presence of flux.
Reason : Oxides are reduced to metals by C or CO and impurities are removed as slag.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

7. **Statement A :** Froth-Flotation process is used to concentrate sulphide ores.
Statement B : The ore particles are preferentially wetted by oil whereas the gangue particles are preferentially wetted by water.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

8. **Statement A :** Zinc and not copper is used in the recovery of Ag from the complex $[Ag(CN)_2]^-$
Statement B : Zinc is a powerful reducing agent than copper.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

9. **Statement A:** During manufacturing of iron, coke is mixed with raw material in hearth, which is converted into carbon monoxide.
Statement B : Fe_2O_3 is partially reduced by carbon monoxide at 600°C - 900°C
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

10. **Statement A :** Aluminium metal is frequently used as a reducing agent for extraction of metals such as Cr, Mn etc.
Statement B : Al has great affinity for oxygen, so it acts as a reducing agent when the metal having high melting point is to be extracted from its oxide.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

11. **Statement A :** Carbon and hydrogen are suitable reducing agents for the isolation of transition elements.
Statement B : Carbon and hydrogen both forms stable carbide and hydride with transition metals.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

12. **Statement A :** Blister copper is electrolytically refined using impure copper as anode and pure copper strip as cathode.
Statement B : Impurities in the blister copper, deposit as anode mud.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

Answer

1.	(2)	5.	(3)	9.	(1)
2.	(3)	6.	(1)	10.	(1)
3.	(1)	7.	(1)	11.	(4)
4.	(1)	8.	(1)	12.	(2)

EXTRACTION
(TRUE / FALSE)

Which of the following is **True (T) or False (F)**?

1. Copper is obtained from Copper matte by heating in bessemer converter
2. For formation of CO from C and O_2 ΔG° continously decreases.
3. Hydraulic washing is a kind of gravity separation as it is based on difference between specific gravities of the ore and the gangue particles
4. Below 1073K coke reduces iron oxide and get converted to CO.
5. Roasting means heating are in limited suppy of air.
6. Baeyer's process in based on the basis of hydrometallurgy.
7. Sn and Pb are purified by liquation.
8. Ge, Si is purified by van Arkel method.
9. Mg reduces SiO_2 below 1966 K.
10. Sodium is extracted by electrolysis of aqueous NaCl.
11. Galena is ore of Zn.
12. All minerals are ores.
13. Al is obtained by heating Al_2O_3 with carbon at high temperature.
14. Al does not reduce MgO below 1500 K.
15. Liquation is used for purification of Bi & Pb.
16. Dolomite is $MgCO_3$ Ca_2 CO_3.
17. Cassiterite is seprated from CuO by electromagnetic sepration.
18. Cresol and aniline are used as froth stablizer.
19. Bauxite contains SiO_2, iron oxide and TiO_2 as impurities.

1.	(T)	6.	(F)	11.	(F)	16.	(T)
2.	(T)	7.	(T)	12.	(F)	17.	(T)
3.	(T)	8.	(F)	13.	(F)	18.	(T)
4.	(T)	9.	(T)	14.	(T)	19.	(T)
5.	(F)	10.	(F)	15.	(T)		

ELECTROCHEMISTRY
(ASSERTION & REASON PRACTICE)

1. **Assertion :** A galvanic cell gives current only if the redox reaction is spontaneous.
Reason : The decrease in free energy of the spontaneous redox reaction gets converted to electrical work.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

2. **Assertion :** Conductivity always decreases with the decrease in concentration both in case of weak and strong electrolytes.
Reason : Number of ions per unit volume increases in both electrolytes on dilution.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

3. **Assertion :** The electrolysis of aqueous NaCl solution gives chlorine at the anode.
Reason : Chlorine has higher reduction potential than water but lower discharge potential.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

4. **Assertion :** Molar conductivity of 0.1 M NH_4OH solution is less than that of 0.001 M NH_4OH solution.
Reason : Dilution increases the degree of ionisation of NH_4OH.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

5. **Assertion :** Rusting of iron is quicker in saline water than in ordinary water.
Reason : Saline water contains Na^+ and Cl^-.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

6. **Assertion :** During electrolysis of CH_3COONa(aq.), the molar ratio of gases formed at anode and cathode is 2 : 1
Reason : Anode : $2CH_3COO^- \rightarrow C_2H_6 + 2CO_2 + 2e^-$
Cathode : $2H^+ + 2e^- \rightarrow H_2$
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

7. **Assertion :** Lead storage battery has almost constant cell potential.
Reason : Most of the reagent used are either solids or concentrated solutes.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

8. **Assertion :** Electrolysis of molten KCl produces Cl_2 at anode.
Reason : Electrode where reduction occurs is referred to as cathode.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Statement A :** A non-spontaneous reaction is taking place in electrolytic cell.
Statement B : In an electrolytic cell external source of voltage is used to bring about chemical reaction.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

10. **Statement A :** When a copper wire is placed in a solution of $AgNO_3$, the solution acquires blue colour.
Statement B : It is due to the formation of soluble complex of copper with $AgNO_3$
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

11. **Statement A :** Electrical conductivity of copper increases with increase in temperature.
Statement B : The electrical conductivity of metals is due to the motion of electrons.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

12. **Statement A :** The order of ionic mobility of alkali metal ions in aqueous solution is
$Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$.
Statement B : The ionic mobility of ions is inversely proportional to the effective size of ion in aqueous medium.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

13. **Statement A :** Na cannot be extracted by the electrolysis of aqueous solution of NaCl.
Statement B : In this electrolysis hydrogen gas is produced instead of sodium due to lesser discharge potential of H^+ than Na^+.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

14. **Statement A :** The conductivity of solutions of different type of electrolytes in the same solvent and at a given temperature is same.
Statement B : The conductivity depends on the charge and size of the ions in which they dissociate.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

15. **Statement A :** The cathode of electrolytic cell during electrolysis of NaCl (aq.) on addition of little red litmus shows a blue colour.
Statement B : In the electrolytic solution sodium hydroxide is produced due to which red litmus shows blue colour.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

16. **Statement A :** At the end of electrolysis using inert electrodes, an aqueous solution of copper sulphate turns colourless.
Statement B : Copper in copper sulphate is converted to copper hydroxide during the electrolysis.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

Answer

1.	(1)	5.	(2)	9.	(1)	13.	(1)
2.	(3)	6.	(4)	10.	(3)	14.	(4)
3.	(1)	7.	(1)	11.	(4)	15.	(1)
4.	(1)	8.	(2)	12.	(1)	16.	(3)

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ELECTROCHEMISTRY
(TRUE/FALSE)

Which of the following is **True or False**?

1. In the Daniel cell if external opposite potential greater than 1.1V is applied, it functions as an *electrolytic cell.*
2. Standard electrode potentials are standard reduction potentials.
3. Standard hydrogen electrode is assigned a zero potential at all temperatures.
4. A negative E^{o} means that the redox couple is a stronger reducing agent than the H^{+}/H_2 couple.
5. Li metal is most powerful reducing agent while Li^{+} is weakest reducing agent in aqueous medium.
6. E_{cell} of Daniel cell increases with increase in concentration of Cu^{2+} ions and decrease in the concentration of Zn^{2+} ions.
7. The potential of hydrogen electrode in contact with a solution of pH = 10 is 0.00V.
8. SI base unit of resistance is $(kg\ m^2)/S^3A^2)$.
9. Certain non-metals like carbon-black, graphite and some organic polymers are electronically conducting.
10. Passage of direct current through ionic solution over a prolonged period can lead to change in its composition due to electrochemical reactions.
11. $1\ S\ m^2\ mol^{-1} = 10^4\ S\ cm^2\ mol^{-1}$.
12. Conductivity always increases with decrease in concentration of both strong and weak electrolyte.
13. For strong electrolyte plot of $s\Lambda_m$ against $\sqrt{C}$ gives a straight line with slope equal to $-A$ and intercept equal to Λ°_m.
14. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to increase in number of ions.
15. EMF of a cell = (oxidation potential of anode) – (oxidation potential of cathode).
16. When a direct current is passed through an aqueous concentrated solution of NaCl, pH of the solution decreases.
17. Same quantity of electricity deposits more of iron from ferric sulphate solution than from ferrous sulphate solution.
18. During electrolysis of concentrated H_2SO_4, $S_2O_8^{2-}$ is formed at anode.
19. In mercury cell reducting agent is Zn and oxidising agent is Hg(II) O.
20. Methane and methanol can be used in fuel cell.
21. One faraday always deposits I mol of the substance at the electrode.
22. Electrolysis of aqueous KF solution gives fluorine at the anode.
23. Galvanized iron sheets remain protected from rusting even if a crack is developed.
24. Sodium ions are discharged in preference to hydrogen ions at the mercury cathode.
25. It is safe to stir $AgNO_3$ solution with Cu spoon.
26. If a current of 96.5 ampere is passed into aqueous $AgNO_3$ solution for 100 second, the weight of Ag deposited is 10.8 g.
27. Difference in Λ°_m of the electrolytes NaX and KX for any X is nearly constant.
28. 1 faraday is charge on one mol of electrons.
29. During electrolysis, reaction with higher value of E^{o} occurs at anode.
30. For the reduction of 1 mole of $Cr_2O_7^{2-}$ to Cr^{+3}, 6 faradays of charge is required.
31. Both E°_{Cell} and ΔG° for the cell reaction are intensive properties.
32. In lead storage battery, during discharge, Pb is converted into $PbSO_4$ at the anode but during recharging, $PbSO_4$ is converted into PbO_2.
33. EMF of a cell generally decreases with increase of temperature.
34. Presence of CO_2 in the air accelerates corrosion.
35. Milli equivalents of a metal discharged at cathode during electrolysis $= \frac{It}{96.5}$.
36. Molar conductance of a weak electrolyte at infinite dilution can not be determined experimentally.
37. Efficiency of fuel cell is given by $\eta = \frac{\Delta G \times 100}{\Delta H}$.
38. A electrochemical cell can be set up only if redox reaction is non-spontaneous.
39. H_2–O_2 fuel cell gives a constant voltage throughout its life.
40. In galvanic cell anode is (–)ve pole while in electrolytic cell anode is + ve pole.
41. The products of electrolysis are always same for reactive and inert electrodes.
42. In galvanic cell, the chemical energy of a spontaneous redox reaction is converted into eletrical work.
43. In electro chemical cell, current flows from cathode to anode in the external circuit.

44. If salt bridge is removed from an electrochemical cell, then the voltage obtained from the cell is zero.
45. Absolute value of standard reduction potential of an electrode can be measured.
46. At 298K, the emf of the cell, standard hydrogen electrode//second half cell gives the oxidation potential of the second half cell.
47. Cu does not react with dil HNO_3 because Cu has positive value of reduction potential and so H^+ cannot oxidise Cu.
48. The oxidation potential of nickel electrode in contact with $NiSO_4$ solution increases if $NiSO_4$ solution is diluted.
49. In the cell,
    Pt, $Cl_2 | Cl^- || H^+ | H_2$, Pt, the Cl^- ions are getting oxidised to Cl_2.
50. Iron rusts in a solution with pH 9-10.
51. During electrolysis of aq. $CuBr_2$ solution using platinum electrodes, H_2 gas is liberated at cathode.
52. Electronic conductance depends on the nature and structure of metal.
53. To determine the cell constant (G^*), generally KCl solution is used.
54. $MgSO_4$ is a 2-1 electrolyte.
55. In some galvanic cells, both electrodes dip into the same electrolytic solution and then salt bridge is not required.
56. By the electrolysis of 2 moles of acidulated water, 2 moles of gases are obtained.
57. Many metals like Na, Mg, Al etc. are produced on large scale by electrochemical reduction of their respective cations.
58. During electrolysis of aq. $CuSO_4$ solution using Cu electrodes, the blue colour of the $CuSO_4$ solution fades with time.
59. In lead storage battery, a 38% solution of sulphuric acid is used as an electrolyte.
60. The amount of electricity required for oxidation or reduction depends on the stoichiometry of the electrode reaction.

Answer

1.	(T)	13.	(T)	25.	(F)	37.	(T)	49.	(T)
2.	(T)	14.	(F)	26.	(T)	38.	(F)	50.	(F)
3.	(T)	15.	(T)	27.	(T)	39.	(T)	51.	(F)
4.	(T)	16.	(F)	28.	(T)	40.	(T)	52.	(T)
5.	(F)	17.	(F)	29.	(F)	41.	(F)	53.	(T)
6.	(T)	18.	(T)	30.	(T)	42.	(T)	54.	(F)
7.	(F)	19.	(T)	31.	(F)	43.	(T)	55.	(T)
8.	(T)	20.	(T)	32.	(T)	44.	(T)	56.	(F)
9.	(T)	21.	(F)	33.	(T)	45.	(F)	57.	(T)
10.	(T)	22.	(F)	34.	(T)	46.	(F)	58.	(F)
11.	(T)	23.	(T)	35.	(T)	47.	(F)	59.	(T)
12.	(F)	24.	(T)	36.	(T)	48.	(T)	60.	(T)

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CHEMISTRY IN ACTION

(TRUE & FALSE/ASSERTION & REASON/ STATEMENTS)

1. **Assertion** : Both ABS & LAS are anionic detergents.
   Reason : Both have high biodegradability.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
2. **Assertion** : Ortho sulpho benzimide (saccharin) is popular sweetening agent and is of great value to diabetic patients.
   Reason : Saccharin is excreted from the body unchanged.
   (1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (2) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
3. **Assertion** : Sodium salt of methyl hydrogen sulphate cannot have detergent action.
   Reason : Sodium salts of linear / branched alkyl benzene sulphonates form ionic micelles in water.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Assertion is true statement but Reason is false
   (3) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (4) Assertion is false
4. **Assertion** : Lead compounds are the starting materials for drug designing.
   Reason : Drug designing involves consideration of drug target and drug metabolism.
   (1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (2) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
5. **Assertion** : Soaps do not work in hard water.
   Reason : Ca^{+2} and Mg^{+2} ions react with soap and makes it insoluble.
   (1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (2) Assertion is true statement but Reason is false
   (3) Assertion is false
   (4) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
6. **Statement-I** : Phenol can act as antiseptic as well as disinfectant.
   Statement-II : Chloroxylenol and terpeneol are the main constituents of dettol.
   (1) Both statement-I and statement-II are incorrect
   (2) Both statement-I and statement-II are correct
   (3) Statement-I is correct but statement-II is incorrect
   (4) Statement-I is incorrect but statement-II is correct

7. **Statement-I** : Aspirin can cause ulcers in the stomach.

Statement-II : Ester group in aspirin gets hydrolysed to acid in the stomach where pH is about 12.

(1) Both statement-I and statement-II are correct

(2) Both statement-I and statement-II are incorrect

(3) Statement-I is incorrect but statement-II is correct

(4) Statement-I is correct but statement-II is incorrect

8. **Statement-I** : Penicillin-G is a broad spectrum antibiotic.

Statement-II : Ampicillin is effective against gram +ve and gram −ve bacteria.

(1) Both statement-I and statement-II are incorrect

(2) Both statement-I and statement-II are correct

(3) Statement-I is correct but statement-II is incorrect

(4) Statement-I is incorrect but statement-II is correct

True & False

9. Soap are good cleansing agents and 100% biogradable.

10. Synthetic detergents are soap less soaps not useful in hard water

11. 1% Phenol kill micro organisms and stop growth. it is harmful for human tissues

12. Brompheniramine is used as a antacid.

13. Chlorodiazepoxide, Meprobamate Equanil are **Non Hypnotic** drugs.

Answers

1.	(3)	6.	(2)	11.	(T)
2.	(2)	7.	(4)	12.	(F)
3.	(3)	8.	(3)	13.	(T)
4.	(1)	9.	(T)		
5.	(4)	10.	(F)		

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CHEMICAL KINETICS
(ASSERTION & REASON/ STATEMENTS)

1. **Assertion** : Hydrogenation of ethene is a first order reaction.
   Reason : It is an elementary reaction.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
2. **Assertion** : When E_a is zero then rate of reaction is independent of temperature.
   Reason : When temperature is equal to infinity, then K = A, only the frequency factor determines the rate.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
3. **Assertion** : Larger the activation energy, lesser is the effect of temperature rise on rate constant K.
   Reason : $K = \frac{A}{e^{Ea/RT}}$.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
4. **Assertion** : The reaction which have low value of activation energy are generally slow.
   Reason : Addition of positive catalyst to reaction mixture decreases the activation energy.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
5. **Assertion** : Whatever be the amount of substance taken and whatever be the value of half life, nothing will be left over of reactant after two half lives for a zero order reaction.
   Reason : For zero order reaction half life time is directly proportional to the initial concentration and inversely proportional to the rate constant of the reaction.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
6. **Assertion** : Two reactions having identical values of energy of activation will have same rate constant if run at the same temperature.
   Reason : Rate of the reaction is directly related to temperature.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false
7. **Assertion** : Rate of Ist order reaction always decrease with increase in concentration of reactants.
   Reason : Ist order reactions are always complex.
   (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Assertion is false

8. **Assertion** : The time taken for 100% completion of a zero order reaction is given by A_0 /K.
Reason : Zero order reactions take finite time to complete as rate does not decrease with decreasing concentration of reactants .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

9. **Assertion** : Rate constant for endothermic reactions increases with increase in temperature whereas rate constant for exothermic reaction decrease with increase in temperature.
Reason : Endothermic reactions are favoured at high temperature but exothermic reactions are favoured at low temperature.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

10. **Assertion** : Increase in temperature decreases half life period of the given reaction.
Reason : For a given order of reaction, half life period increases as initial concentration increases.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

11. **Assertion** : If order of a gas phase reaction is 1.5, the mechanism must involve intermediate.
Reason : Intermediates do not appear in final reaction.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

12. **Assertion** : For a reversible reaction, $K_c = e^{(E_b - E_f)/RT}$ holds good at equilibrium (Assuming A constant).
Reason : $(E_b - E_f)$ is always positive for a reaction at equilibrium .
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

13. **Assertion** : Acid catalyzed decomposition of ethyl acetate follows first order kinetics.
Reason : Water does not participate in the reaction.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

14. **Assertion** : Two different reactions can never have the same rate of reaction.
Reason : Rate of a reaction always depends on frequency of collisions and Arrhenius factor only.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

15. **Statement-I** : The units of rate constant for zero order equation is $mol^{-1} L\ sec^{-1}$.
Statement-II : Molecularity of the reaction can be zero or a non integer.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

16. **Statement-I** : For a second order reaction $X \rightarrow Y$ the rate of the reaction 9 times if concentration of X is increased 3 times.
Statement-II : A second order reaction will necessarily be bimolecular.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

17. **Statement-I** : For the elementary reaction $H_2(g) + I_2(g) \rightarrow 2HI(g)$ the order and molecularity are same.
Statement-II : For a zero order reaction order and molecularity can never be same.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

18. **Statement-I** : The catalyst effects the ΔG of the reaction.
Statement-II : For a reaction with equal activation energies of the forward and backward reactions the ΔH as well as ΔG is equal to zero.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

19. **Statement-I** : In Arrhenius equation, 'A' may be termed as the rate constant at zero activation energy.
Statement-II : Activation energy is less than the threshold energy for a reaction.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

Answers

1.	(3)	8.	(1)	15.	(2)
2.	(2)	9.	(4)	16.	(2)
3.	(4)	10.	(3)	17.	(1)
4.	(4)	11.	(2)	18.	(2)
5.	(2)	12.	(3)	19.	(1)
6.	(4)	13.	(3)		
7.	(4)	14.	(4)		

CHEMICAL KINETICS
(TRUE & FALSE)

1. For the reaction $2HI_{(g)} \rightarrow H_{2(g)} + I_{2(g)}$ the rate is given by
$= -\frac{1}{2}\frac{d}{dt}[HI]$.
2. Rate law for any reaction cannot be predicted by merely looking at the balanced chemical equation.
3. The overall order of the reaction which has the rate expression rate $= k[A]^{3/2}[B]^{-1}$ is equal to 1/2.
4. Decomposition of ammonium nitrite is a unimolecular reaction.
5. For the reaction $2H_2O_2 \xrightarrow[\text{alkaline medium}]{I^-} 2H_2O + O_2$ the rate equation is Rate $= k[H_2O_2][I^-]$.
6. The order of reaction always increases with increase in temperature.
7. If initial concentration is reduced to $1/4^{th}$ in a zero order reaction the time taken to complete half reaction remains same.
8. The pre exponential factor calculation is based on the fact that reacting species must come together leading to formation of the transistion state which then transforms to products.
9. Molecularity has no meaning in complex reaction.
10. Specific reaction rate does not change with temperature.
11. The rate constant of a reaction is independent of nature of reactants.
12. The pre exponential factor A has the same units for all reactions.
13. For first order reaction, time taken for completion of 75% of reaction is twice of $t_{1/2}$ of the reaction.
14. Half life of second order reaction decreases with increase in concentration of reactant.
15. The units of rate constant are $(conc.)^{1-n}$ $time^{-1}$.
16. The slope of graph between log (a-x) Vs time 1^{st} order reaction is equal to $\frac{k}{2.303}$.
17. The temperature coefficient of a reaction is the ratio of rate constants at any two temperatures.
18. If $\log k = 16 - \frac{1.25 \times 10^4}{T}$, the value of frequency factor is 10^{16}.
19. The rate constant for both endothermic and exothermic reaction increases with temperature.
20. The units of rate constant for photochemical combination of $H_2(g)$ and $Cl_2(g)$ to produce HCl(g) is mol L^{-1} sec^{-1}.
21. An elementary bimolecular reaction becomes first order if one of the reactant is taken in excess.
22. The rate of reaction is uniform in zero order reaction.
23. Average and instantaneous rate of reaction defined for micro and macroscopic time intervals respectively.
24. A zero order reaction must be a complex reaction.
25. A specie that appears in the rate law of reaction cannot be intermediate of that reaction.
26. If the reaction has rate $= k[A][B]^{3/2}$ then reaction may be elementary.
27. A positive catalyst can change ΔH of the reaction.
28. Acid catalysed hydrolysis of ester is pseudo first order reaction.
29. The plot of k versus $\frac{1}{T}$ is linear.
30. The molecularity of the complex reaction,
$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ is two.
31. For an elementary reaction $2A + B \rightarrow A_2B$ if the volume of vessel is quickly reduced to half of its original volume then rate of reaction increases eight times.
32. For a reaction as $T \rightarrow \infty$ then $k = A$.
33. Differential rate law for first order reaction.
$R \rightarrow P$ is $\frac{d[R]}{dt} = -k[R]$.

34. The number of collisions per second per unit volume of the reaction mixture is called collision frequency.

35. A small amount of the catalyst can catalyse a large amount of reactants.

36. For a first order reaction the concentration of reactant decreases exponentially with time.

37. The Arrehenius equation is applicable only to reactions of first order.

38. The slope of tangent to find instantaneous rate is always positive whether we use plot of concentration of reactant or product versus time.

39. Fraction of molecules with most propable velocity decreases with increase of temperature.

40. Hydrolysis of ethyl acetate in the acidic or alkaline medium is a pseudo first order reaction.

Answer

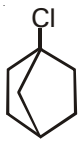
1.	(T)	11.	(F)	21.	(T)	31.	(T)
2.	(T)	12.	(F)	22.	(T)	32.	(T)
3.	(T)	13.	(T)	23.	(F)	33.	(T)
4.	(T)	14.	(T)	24.	(T)	34.	(T)
5.	(T)	15.	(T)	25.	(T)	35.	(T)
6.	(F)	16.	(F)	26.	(F)	36.	(T)
7.	(F)	17.	(F)	27.	(F)	37.	(F)
8.	(T)	18	(T)	28.	(T)	38.	(F)
9.	(T)	19.	(T)	29.	(F)	39.	(T)
10.	(F)	20.	(T)	30.	(F)	40.	(F)

ALKYL & ARYL HALIDES
(ASSERTION-REASON / STATEMENTS QUESTIONS)

1. **Assertion :** S_{N^2} reaction of CH_3Br is faster in DMSO than that in H_2O.
Reason : DMSO has higher capacity to solvate the nucleophile.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

2. **Assertion :** Water reacts faster with $CH_3CH_2OCH_2Cl$ than with $CH_3OCH_2CH_2Cl$.
Reason : $CH_3CH_2OCH_2Cl$ forms more stable carbocation than $CH_3OCH_2CH_2Cl$.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

3. **Assertion :** On reacting with NBS, Penta–1,4–diene gives 3–bromopenta–1,4–diene as major product.
Reason : Penta–1,4–diene is an isolated diene.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

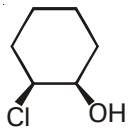
4. **Assertion :** 

does not give precipitate when treated with $AgNO_3$ solution.
Reason : The nucleophilic substitution reaction does not take place at bridge head carbon atoms.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

5. **Assertion :** During S_{N^2} mechanism, bulky alkyl groups hinder the approach of nucleophile.
Reason : S_{N^2} occurs with racemisation.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

6. **Assertion :** Allyl bromide shows faster rate than ethyl bromide, when both undergo S_{N^2} reaction separately with same attacking nucleophile.
Reason : Allyl carbocation is more stable than $CH_3CH_2^+$ (ethyl) cabrocation.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

7. **Assertion :** Aqueous hydrohalogen acids are used to prepare alkyl halides from alkenes.
Reason : Hydrogen iodide readily reacts with alkenes to form alkyl halides.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

8. **Assertion:** 

On treatment with alcoholic KOH gives cyclohexanone.

Reason : Alcoholic KOH is a reagent which can be used for dehydrohalogenation.

(1) Both Assertion and Reason are true but reason is not correct explanation of assertion.

(2) Both Assertion and Reason are true & reason is correct explanation of assertion.

(3) Assertion is true but Reason is false.

(4) Assertion is false.

9. **Assertion:** Tertiary butyl halide is treated with sodium ethoxide to give t-butylethyl ether

Reason : 3° halide readily undergoes elimination with strong base / strong nucleophile.

(1) Both Assertion and Reason are true & reason is correct explanation of assertion.

(2) Both Assertion and Reason are true but reason is not correct explanation of assertion.

(3) Assertion is false.

(4) Assertion is true but Reason is false.

10. **Assertion:** A mixture of an alkyl halide and aryl halide gives an alkylarene when treated with sodium in dry ether.

Reason : The reaction in called Fittig reaction.

(1) Both Assertion and Reason are true & reason is correct explanation of assertion.

(2) Both Assertion and Reason are true but reason is not correct explanation of assertion.

(3) Assertion is true but Reason is false.

(4) Assertion is false.

11. **Assertion:** Alcohols can't be converted into alkyl bromides by reacting with NaBr.

Reason : Br^- being very weak base can't displace strong base OH^-.

(1) Assertion is false.

(2) Both Assertion and Reason are true but reason is not correct explanation of assertion.

(3) Assertion is true but Reason is false.

(4) Both Assertion and Reason are true & reason is correct explanation of assertion.

12. **Assertion:** Aryl halides and vinyl halides are less reactive than alkyl halides and are not easily hydrolysed.

Reason : C – X bond in aryl halides acquire double bond character due to resonance, which makes its cleavage difficult.

(1) Both Assertion and Reason are true & reason is correct explanation of assertion.

(2) Both Assertion and Reason are true but reason is not correct explanation of assertion.

(3) Assertion is true but Reason is false.

(4) Assertion is false.

13. **Statement I :** One of carbon in 2-Chloro propane becomes pentavalent for short time on reaction with I^- in dry acetone solvent.

Statement II : NaCl formed is precipitated in dry acetone .

(1) Both statements I & II are correct

(2) Both statements I & II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

14. **Statement I :** Propane can be converted to alkyl bromide by reacting with Br_2/UV light.

Statement II : Free radical bromination of alkanes gives a complex mixture of isomeric mono and polyhaloalkanes.

(1) Both statements I & II are correct

(2) Both statements I & II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

15. **Statement I :** In the hydrolysis of tertiary butyl bromide by the S_N1 mechanism, rate determining step is the ionization of tertiary butyl bromide, leading to the formation of carbocation.

Statement II : Since S_N1 reaction is of second order, its rate is independent of the concentration of OH.

(1) Both statements I & II are correct

(2) Both statements I & II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

16. **Statement I :** Addition of Br_2 on maleic acid gives d & l isomers of product.
Statement II : The addition of Br_2 on maleic acid follow cis addition.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

17. **Statement I :** Reaction of tert. butyl chloride with Na gives 2, 2, 3, 4-tetramethyl butane.
Statement II : Tert. butyl chloride on wurtz reaction gives alkene.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

18. **Statement I :** Ethylene dichloride is a vicinal dihalide.
Statement II : Ethylene dichloride on reaction with exces sodamide yield ethyne.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

19. **Statement I :** The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride
Statement II : The $C^{-}Cl$ bond length in cyclohexyl chloride is shorter than that of cholorbenzene
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

Answers

1.	(3)	6.	(1)	11.	(4)	16.	(3)
2.	(1)	7.	(4)	12.	(1)	17.	(4)
3.	(4)	8.	(1)	13.	(1)	18.	(1)
4.	(1)	9.	(3)	14.	(1)	19.	(2)
5.	(3)	10.	(3)	15.	(3)		

ALKYL HALIDES
(True/False)

Which of the following is **True (T) or False (F)**?

1. In haloalkanes, carbon atom of C-X bond is sp^3 hybridised while it is sp^2 hybridised in haloarenes.
2. S_{N^2} mechanism in alkyl halides leads to racemisation.
3. Alkyl chlorides are best prepared from alcohols by the actions of thionyl chloride.
4. Sulphuric acid is not used during the reaction of alcohols with KI.
5. The dipole moment of CH_3F is greater than CH_3Cl.
6. Addition of HBr to alkene in the presence of peroxide follows ionic mechanism.
7. Ethyl chloride is more reactive than vinyl chloride towards nucleophilic substitution reaction.
8. S_{N^1} reaction involves the carbonium ion intermediate.
9. Protic polar solvent like H_2O, CH_3COOH favours S_{N^1} mechanism.
10. Out of benzyl chloride and chlorobenzene, only chlorobenzene gives white ppt with $AgNO_3$ solution.
11. Allyl chloride is less reactive than n-propyl chloride toward nucleophilic sustitution reaction.
12. Unsymmetrical alkanes can be prepared in good yield by Wurtz reaction.
13. t-Butyl methyl ether is formed when sodium methoxide reacts with t-butyl bromide.
14. Primary alkyl halides almost always react predominantly by S_{N^1} mechanism whereas tertary alkyl halides react predominantly by S_{N^2} mechanism.
15. E_1 or E_2 reactions leads to formation of least substituted alkenes.
16. Intermediate allylic carbocation is stabilized by resonance.
17. OH^- and OR^- are both stronger bases and more powerful nucleophiles than their conjugate acids H_2O and ROH.
18. NH_3 is both stronger base and more powerful nucleophile than H_2O.
19. In Grignard reagent the carbon magnesium bond is Ionic.
20. The cabocation formed in slow step of S_{N^1} reaction is chiral.
21. Antiseptic properties of triiodomethane are due to liberation of free iodine and not due to iodoform itself.
22. Halogenation of benzene takes place in the presence of halgen carrier such as anhydrous $AlCl_3$ or $FeCl_3$.
23. Use of freons as propellants and refrigerants has been banned since they deplete the protective ozone layer surrounding our planet.
24. $CHCl_3$ is lighter than water.
25. SO_4^{2-} ion is a better nucleophile than Cl^- ion.
26. Iodoform test is not given by CH_3CH_2OH.
27. Butan-2-ol and pentan-2-ol can be distinguished by iodoform.

Answers

1.	(T)	8.	(T)	15.	(F)	22.	(T)
2.	(F)	9.	(T)	16.	(T)	23.	(T)
3.	(T)	10.	(F)	17.	(T)	24.	(F)
4.	(T)	11.	(F)	18.	(T)	25.	(F)
5.	(F)	12.	(F)	19.	(F)	26.	(F)
6.	(F)	13.	(F)	20.	(F)	27.	(F)
7.	(T)	14.	(F)	21.	(T)		

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OPTICAL ISOMERISM
(ASSERTION-REASON / STATEMENTS /True/False QUESTIONS)

1. **Statement I :** The asymmetry of molecule is responsible for the optical activity in organic compounds.
   Statement II : Crystals of certain compounds exist in the form of mirror images.
   (1) Both statements I & II are correct
   (2) Both statements I & II are incorrect
   (3) Statement I is correct but statement II is incorrect
   (4) Statement I is incorrect but statement II is correct

2. **Statement-I :** Sign of optical rotation is necessarily related to the absolute configuration of molecule.
   Statement-II : If one enantiomer of a substance is dextro rotatory, then the other is leavoratatory.
   (1) Both statements I & II are correct
   (2) Both statements I & II are incorrect
   (3) Statement I is correct but statement II is incorrect
   (4) Statement I is incorrect but statement II is correct

3. **Assertion:** If boiling point (+) 2-bromopropanoic acid is 203°C, then boiling point of (–)2-bromopropanoic acid is less than 203°.
   Reason : (±) 2-bromopropanoic acid will have zero optical rotation.
   (1) Both Assertion and Reason are true & reason is correct explanation of assertion.
   (2) Both Assertion and Reason are true but reason is not correct explanation of assertion.
   (3) Assertion is true but Reason is false.
   (4) Assertion is false.

4. **Assertion:** Propan-2-ol does not contain an asymmetric carbon
   Reason : All four groups attached to tetrahedral carbon in propan-2-ol are different
   (1) Both Assertion and Reason are true but reason is not correct explanation of assertion.
   (2) Both Assertion and Reason are true & reason is correct explanation of assertion.
   (3) Assertion is true but Reason is false.
   (4) Assertion is false.

True or False

Which of the following is **True (T) or False (F)**?

5. There are three outcomes for a reaction at an asymmetric carbon atom
6. Nonchiral objects have nonsuperimposible mirror images
7. Enantiomers of 2,3-dihydroxypropanal only differ w.r.t rotation of plane polarised light
8. Bromochloro-iodomethane has two optical isomers.
9. Butan-2-ol rotates the plane polarised light.
10. If during a reaction, no bond to the stereocenter is broken, there is preservation of integrity of spatial arrangment of bonds to the asymmetric center.
11. Hydrolysis of optically active 2-bromobutane results in formation of (±) butan-1-ol.
12. Plane polarised light is produced by passing ordinary light through Nicol prism.

Answers

1.	(1)	7.	(T)
2.	(4)	8.	(T)
3.	(4)	9.	(T)
4.	(3)	10.	(T)
5.	(T)	11.	(F)
6.	(F)	12.	(T)