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DEPARTMENT OF GENERAL SCIENCE & HUMANITIES

FIRST YEAR (FY)

SCHEME: I

SEMESTER: II

NAME OF SUBJECT: APPLIED SCIENCE

SUBJECT CODE: 22211

**UNIT WISE MULTIPLE CHOICE
QUESTIONS BANK**



Question Bank for Multiple Choice Questions

Program: Diploma in Electrical Engineering	Program Code:- EE
Scheme:- I	Semester:- 2
Course:- Applied Science Physics	Course Code:- 22211

01 – Electricity and Capacitance	Marks:- 09
Content of Chapter:- 1.1 Capacitors and capacitance. 1.2 Parallel plate capacitor. effect of dielectric on capacitance. 1.3 Combination of capacitors. energy stored in capacitor. 1.4 Cells emf of cell, internal resistance of cell. Kirchhoff's laws, Wheatstone's' bridge. 1.5 Potential gradient potentiometer.	

1. Capacitor is a device used to

- (A) store electrical energy
(B) vary the resistance
(C) store magnetic energy
(D) dissipate energy

Answer: - Option A

Explanation: - Capacitor is used to store the charge. It stores electrical energy between the plates.

2. Capacitor stores which type of energy?

- (A) kinetic energy
(B) vibrational energy
(C) potential energy
(D) heat energy

Answer: - Option C

Explanation: - Capacitor store charge in between the plates. This charge is stationary so We can say Capacitor store potential energy.

3. Capacitor blocks ___ after long time.

- (A) alternating current
(B) direct current
(C) both alternating and direct current
(D) neither alternating nor direct current

Answer: - Option B

Explanation: - Capacitor blocks direct current at steady state.

4. Why does capacitor block dc signal at steady state?

- (A) due to high frequency of dc signal
(B) due to zero frequency of dc signal
(C) capacitor does not pass any current at steady state
(D) due to zero frequency of dc signal

Answer: - Option D

Explanation: - Frequency of dc signal is zero. So, Capacitive reactance $X_C = 1/2\pi fC$ becomes infinite and capacitor behaves as open circuit for dc signal. Hence, capacitor block dc signal.

5. If a parallel plate capacitor of plate area 2m^2 and plate separation 1m store the charge of $1.77 \times 10^{-11}\text{C}$. What is the voltage across the capacitor?

- (A) 1V (B) 2V
(C) 3V (D) 4V

Answer: - Option A

Explanation: - $C = \epsilon_0 A/d$; On substituting values of d, A , we get $C = 2\epsilon_0$; $Q=CV, V = 1\text{V}$

6. Which of the following is a passive device?

- (A) Transistor (B) Rectifier
(C) Capacitor (D) Vacuum Tubes

Answer: - Option C

Explanation: - Capacitor is a passive device as it consumes power rest all generate power so, they are active devices

7. What is the value of capacitance of a capacitor which has a voltage of 4V and has 16C of charge?

- (A) 2F (B) 4F
(C) 6F (D) 8F

Answer: - Option B

Explanation: -By formula $Q=CV$

8. For which medium capacitance is high?

- (A) Air (B) Mica
(C) Water (D) Metal

Answer: - Option D

Explanation: - Metals are assumed to have a high value of dielectric constant so they have high capacitance.

9. What is the relation between current and voltage in a capacitor?

- (A) $I=1/C \times \int Vdt$ (B) $I=C dv/dt$
(C) $I=1/C dv/dt$ (D) $I=Ct$

Answer: - Option B

Explanation: - Current=rate of change of charge $I=dQ/dt$. $Q=CV$. C (capacitance) is constant for a given Capacitor so $I=C dv/dt$.

10. If 2V is supplied to a 3F capacitor, calculate the charge stored in the capacitor.

- (A) 1.5C (B) 6C
(C) 2C (D) 3C

Answer: - Option B

Explanation: - Q is directly proportional to V . The constant of proportionality in this case is C , that is, the capacitance. Hence $Q=CV$. $Q=3 \times 2=6\text{C}$.

11. Calculate the current in the capacitor having 2V supply voltage and 3F capacitance in 2 seconds.

- (A) 2A (B) 5A
(C) 6A (D) 3A

Answer: - Option D

Explanation: - Q is directly proportional to V . The constant of proportionality in this case is C , that is, the capacitance. Hence $Q=CV$. $Q=3 \times 2=6\text{C}$. $I=Q/t= 6/2=3\text{A}$

12. A $4\mu\text{F}$ capacitor is charged to 120V, the charge in the capacitor would be?

- (A) 480C (B) 480microC
(C) 30C (D) 30microC

Answer: - Option B

Explanation: - Q is directly proportional to V. The constant of proportionality in this case is C, that is, the capacitance. Hence $Q=CV$. $Q=4 \times 120=480\mu\text{C}$.

13. For high frequencies, capacitor acts as _____

- (A) Open circuit (B) Short circuit
(C) Amplifier (D) Rectifier

Answer: - Option B

Explanation: - Capacitive impedance is inversely proportional to frequency. Hence at very high frequencies, the impedance is almost equal to zero, hence it acts as a short circuit and there is no voltage across it.

14. For very low frequencies, capacitor acts as _____

- (A) Open circuit (B) Short circuit
(C) Amplifier (D) Rectifier

Answer: - Option A

Explanation: - Capacitive impedance is inversely proportional to frequency. Hence at very low frequencies the impedance is almost infinity and hence acts as an open circuit and no current flows through it.

15. A capacitor consists of _____

- (A) Two conductors (B) Two semiconductors
(C) Two dielectrics (D) Two insulators

Answer: - Option A

Explanation: - A capacitor consists of two conductors connected in parallel to each other so that it can store charge in between the plates.

16. Capacitor preferred when there is high frequency in the circuits is _____

- (A) Electrolyte capacitor (B) Mica capacitor
(C) Air capacitor (D) Glass capacitor

Answer: - Option B

Explanation: - Mica capacitors are preferred for high frequency circuits because they have low ohmic losses and less reactance.

17. Capacitance increases with _____

- (A) Increase in plate area (B) Decrease in plate area
(C) Increase in distance between the plates (D) Increase in density of the material

Answer: - Option A

Explanation: - Capacitance is directly proportional to the plate area. Hence as the plate area increases, the capacitance also increases.

18. Capacitance increases with _____

(A) Increase in distance between the plates

(B) Decrease in plate area

(C) Decrease in distance between the plates

(D) Increase in density of the material

Answer: - Option C

Explanation: - Capacitance is inversely proportional to the distance between the two parallel plates. Hence, as the distance between the plate decreases, the capacitance increases.

19. Which among the following expressions relate charge, voltage and capacitance of a capacitor?

(A) $Q=C/V$

(B) $Q=V/C$

(C) $Q=CV$

(D) $C=Q^2V$

Answer: - Option C

Explanation: - Q is directly proportional to V . The constant of proportionality in this case is C , that is, the capacitance. Hence $Q = CV$

20. If a 2F capacitor has 1C charge, calculate the voltage across its terminals.

(A) 0.5V

(B) 2V

(C) 1.5V

(D) 1V

Answer: - Option A

Explanation: - Q is directly proportional to V . The constant of proportionality in this case is C , that is, the capacitance. Hence $Q = CV$; $V = Q/C = 1/2 = 0.5V$.

21. What is the voltage across a capacitor at the time of switching, that is, when $t=0$?

(A) Infinity

(B) 0V

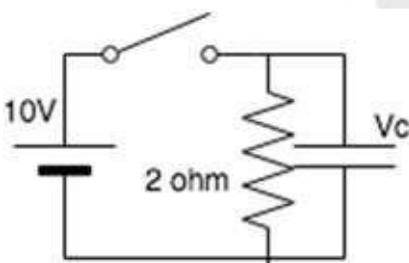
(C) Cannot be determined

(D) 1V

Answer: - Option B

Explanation: - At the time of switching, when $t=0$, the capacitor acts as a short circuit. The voltage across a short is always equal to zero hence the voltage across the capacitor is equal to zero

22. What is the voltage across the capacitor if the switch is closed and steady state is reached?



(A) 8V

(B) 0V

(C) 10V

(D) Infinity

Answer: - Option C

Explanation: - When steady state is reached, the capacitor acts as an open circuit and the 10V is connected in parallel to it. Hence $V_c=10V$

23. If one plate of a parallel plate capacitor is charged to positive charge the other plate is charged to?

- (A) Positive
- (B) Negative
- (C) Positive or negative
- (D) Not charged

Answer: - Option B

Explanation: - If one plate is charged to positive, the other plate is automatically charged to negative so that it can store electrical charge.

24. When the voltage across a capacitor increases, what happens to the charge stored in it?

- (A) Increases
- (B) Decreases
- (C) Becomes zero
- (D) Cannot be determined

Answer: - Option A

Explanation: - When the voltage across a capacitor increases, the charge stored in it also increases because a charge is directly proportional to voltage, capacitance being the constant of proportionality.

25. When will capacitor fully charged?

- (A) When the voltage across its plates is half the voltage from ground to one of its plates
- (B) When the current through the capacitor is a $1/\sqrt{2}$ time its value
- (C) When the supply voltage is equal to the capacitor voltage
- (D) Never

Answer: - Option C

Explanation: - When the capacitor voltage is equal to the supply voltage the current stops flowing through the circuit and the charging phase is over.

26. What happens to the current flow in a fully charged capacitor?

- (A) Current flow stops
- (B) Current flow doubles
- (C) Current flow becomes half its original value
- (D) Current flow becomes one-fourth its original value

Answer: - Option A

Explanation: - When a capacitor is fully charged, it does not store any more charge. There is no change in charge with time. Current is the rate of change of charge, hence it becomes zero, or stops.

27. Calculate the capacitance of a capacitor that stores 40microC of charge and has a voltage of 2V.

- (A) 20F
- (B) 20 μ F
- (C) 10F
- (D) 10 μ F

Answer: - Option B

Explanation: - Q is directly proportional to V. The constant of proportionality in this case is C, that is, the capacitance. Hence $C=Q/V$. $C=40\text{microC}/2V=20\text{microF}$.

28. What happens to the capacitance when the voltage across the capacitor increases?

- (A) Decreases
- (B) Increases
- (C) Becomes 0
- (D) No effect

Answer: - Option D

Explanation: - Q is directly proportional to V. The constant of proportionality in this case is C, that is the capacitance. Capacitance is a constant so it will not change on changing voltage

29. A power factor of a circuit can be improved by placing which, among the following, in a circuit?

- (A) Inductor (B) Capacitor
(C) Resistor (D) Becomes zero

Answer: - Option B

Explanation: - Power factor = Real power/Apparent power = kW/kVA. By adding a capacitor in a circuit, an additional kW load can be added to the system without altering the kVA. Hence, the power factor is improved.

30. When the supply frequency increases, what happens to the capacitive reactance in the circuit?

- (A) Increases (B) Decreases
(C) Remains the same (D) Becomes zero

Answer: - Option B

Explanation: - The expression for capacitive reactance is: $X_c = 1/(2\pi fC)$. This relation shows that frequency is inversely related to capacitive reactance. Hence, as supply frequency increases, the capacitive reactance decreases.

31. Calculate the time constant of a series RC circuit consisting of a 100 microF capacitor in series with a 100Ω resistor.

- (A) 0.1 sec (B) 0.1 m sec
(C) 0.01 sec (D) 0.01 m sec

Answer: - Option C

Explanation: - The time constant of a RC circuit = $R \times C = 100 \times 10^{-6} \times 100 = 0.01$ sec

32. Capacitors charge and discharge in _____ manner.

- (A) Linear (B) Constant
(C) Square (D) Exponential

Answer: - Option D

Explanation: - Capacitors charge and discharge in an exponential manner because of the relation: $X_c = 1/(2\pi f C)$ and $Q = CV \therefore Q = V/(2\pi f X_c)$. X_c is complex which can be written in the form of exponent through Euler's rule.

33. Air has a dielectric constant of

- (A) Unity (B) Zero
(C) Infinity (D) Hundred

Answer: - Option A

Explanation: - Dielectric constant of air is the same as that of a vacuum which is equal to unity. Dielectric constant of air is taken as the reference to measure the dielectric constant of all other materials.

34. What is the value of capacitance of a capacitor which has a voltage of 4V and has 8C of charge?

- (A) 2F (B) 4F
(C) 6F (D) 8F

Answer: - Option A

Explanation: - Q is directly proportional to V. The constant of proportionality in this case is C, that is, the capacitance. Hence $Q = CV$. From the relation, $C = Q/V = 8/4 = 2F$.

35. Unit of capacitance is _____

- (A) Volts
(C) Henry

- (B) Farad
(D) Newton

Answer: - Option B

Explanation: - Volts is the unit of voltage, Henry for inductance and Newton for a force. Hence the unit for capacitance is Farad

36. What will happen to the capacitor just after the source is removed?

- (A) It will not remain in its charged state
(C) It will start discharging

- (B) It will remain in its charged state
(D) It will become zero

Answer: - Option B

Explanation: - As soon as the source is removed, the capacitor does not start discharging it remains in the same charged state

37. Which among the following equations is incorrect?

- (A) $Q=CV$
(C) $V=Q/C$

- (B) $Q=C/V$
(D) $C=Q/V$

Answer: - Option B

Explanation: - Q is directly proportional to V . The constant of proportionality in this case is C , that is, the capacitance. Hence $Q=CV$. From the given relation we can derive all the equations except for $Q=C/V$.

38. Capacitance is directly proportional to _____

- (A) Area of cross section between the plates
(C) Both area and distance

- (B) Distance of separation between the plates
(D) Neither area nor distance

Answer: - Option A

Explanation: - The relation between capacitance, area and distance between the plates is: $C = \epsilon \frac{A}{D}$. According to this relation, the capacitance is directly proportional to the area.

39. What is the total capacitance when three capacitors, C_1 , C_2 and C_3 are connected in parallel?

- (A) $C_1/(C_2+C_3)$
(C) $C_2/(C_1+C_3)$

- (B) $C_1+C_2+C_3$
(D) $1/C_1+1/C_2+1/C_3$

Answer: - Option B

Explanation: - When capacitors are connected in parallel, the total capacitance is equal to the sum of the capacitance of each of the capacitors. Hence $C_{\text{total}} = C_1 + C_2 + C_3$.

40. If three capacitors of 1F, 2F and 10F are connected in parallel, Calculate the total capacitance.

- (A) 10F
(C) 13F

- (B) 15F
(D) 20F

Answer: - Option C

Explanation: - The equivalent capacitance when capacitors are connected in parallel is the sum of all the capacitors. $C = 1 + 2 + 10 = 13F$

41. Three capacitors of 1F, 2F and 10F are connected in parallel. If the total charge stored in the combination is 13C, Calculate the voltage across the capacitors.

- (A) 1V (B) 2V
(C) 3V (D) 4V

Answer: - Option A

Explanation: - The equivalent capacitance when capacitors are connected in parallel is the sum of all the capacitors. $C = 1 + 2 + 10 = 13F$; $V = Q/C = 13/13 = 1V$.

42. Three capacitors of 1F, 2F and 10F are connected in parallel. If the 100V is applied across the capacitors, Calculate the charge in the 2F capacitor.

- (A) 200C (B) 100C
(C) 300C (D) 400C

Answer: - Option A

Explanation: - Since the capacitors are connected in parallel, the voltage across each is the same, it does not get divided. $Q = CV = 2*100 = 200C$.

43. Three capacitors of 1F, 2F and 10F are connected in parallel. If the 100V is applied across the capacitors, Calculate the charge in the 1F capacitor.

- (A) 200C (B) 100C
(C) 300C (D) 400C

Answer: - Option B

Explanation: - Since the capacitors are connected in parallel, the voltage across each is the same, it does not get divided. $Q = CV = 1*100 = 100C$

44. Two capacitors of 1F and 2F are connected in parallel. If the 100V is applied across the capacitors, Calculate the total charge of the system.

- (A) 200C (B) 100C
(C) 300C (D) 400C

Answer: - Option C

Explanation: - The equivalent capacitance when capacitors are connected in parallel is the sum of all the capacitors. $C = 1 + 2 = 3F$; $Q = CV = 3*100 = 300V$.

45. When capacitors are connected in parallel, the total capacitance is always _____ the individual capacitance values.

- (A) Greater than (B) Less than
(C) Equal to (D) Cannot be determined

Answer: - Option A

Explanation: - When capacitors are connected in parallel, the total capacitance is equal to the sum of the capacitance of each of the capacitors. Hence $C_{total} = C_1 + C_2 + C_3$. Since it is the sum of all the capacitance values, the total capacitance is greater than the individual capacitance values.

46. When capacitors are connected in parallel, what happens to the effective plate area?

- (A) Increases (B) Decreases
(C) Remains the same (D) Becomes zero

Answer: - Option A

Explanation: - When capacitors are connected in parallel, the top plates of each of the capacitors are connected together while the bottom plates are connected to each other. This effectively increases the top plate area and the bottom plate area.

47. Three capacitors having a capacitance equal to 2F, 4F and 6F are connected in parallel. Calculate the effective parallel.

- (A) 10F
- (B) 11F
- (C) 12F
- (D) 13F

Answer: - Option C

Explanation: - When capacitors are connected in parallel, the total capacitance is equal to the sum of the capacitance of each of the capacitors. Hence $C_{total} = C_1 + C_2 + C_3 = 2 + 4 + 6 = 12F$

48. Two capacitors having capacitance value 4F, three capacitors having capacitance value 2F and 5 capacitors having capacitance value 1F are connected in parallel, calculate the equivalent capacitance.

- (A) 20F
- (B) 19F
- (C) 18F
- (D) 17F

Answer: - Option B

Explanation: - When capacitors are connected in parallel, the total capacitance is equal to

the sum of the capacitance of each of the capacitors. Hence $C_{total} = 4 + 4 + 2 + 2 + 2 + 1 + 1 + 1 + 1 + 1 = 19F$

49. What is the total capacitance when two capacitors C1 and C2 are connected in series?

- (A) $(C_1 + C_2) / C_1 C_2$
- (B) $1/C_1 + 1/C_2$
- (C) $C_1 C_2 / (C_1 + C_2)$
- (D) $C_1 + C_2$

Answer: - Option C

Explanation: - When capacitors are connected in series, the equivalent capacitance is:

$1/C_{total} = 1/C_1 + 1/C_2$, therefore $C_{total} = C_1 C_2 / (C_1 + C_2)$.

50. N capacitors having capacitance C are connected in series, calculate the equivalent capacitance.

- (A) C/N
- (B) C
- (C) CN
- (D) N/C

Answer: - Option D

Explanation: - When capacitors are connected in series, the equivalent capacitance is:

$1/C_{total} = 1/C + 1/C + 1/C + \dots$ N times.

$1/C_{total} = N/C$.

$C_{total} = C/N$.

51. When capacitors are connected in series, the equivalent capacitance is ___ each individual capacitance

- (A) Greater than
- (B) Less than
- (C) Equal to
- (D) Insufficient data provided

Answer: - Option B

Explanation: - When capacitors are connected in series, the equivalent capacitance is:

$1/C_{total} = 1/C_1 + 1/C_2$. Since we find the reciprocals of the sum of the reciprocals, the equivalent capacitance is less than the individual capacitance values.

52. What is the equivalent capacitance?

- (A) 1.5F (B) 0.667F
(C) 2.45F (D) 2.75F

Answer: - Option B

Explanation: - When capacitors are connected in series, $1/C_{\text{total}} = 1/C_1 + 1/C_2 = 1/2 + 1 = 3/2$
 $C_{\text{total}} = 2/3 = 0.667\text{F}$

54. When capacitors are connected in series _____ remains the same.

- (A) Voltage across each capacitor (B) Charge
(C) Capacitance (D) Resistance

Answer: - Option B

Explanation: - When capacitors are connected in series, the charge remains the same because the same amount of current flow exists in each capacitor.

55. When capacitors are connected in series _____ Varies

- (A) Voltage across each capacitor (B) Charge
(C) Capacitance (D) Resistance

Answer: - Option A

Explanation: - When capacitors are connected in series, the voltage varies because the voltage drop across each capacitor is different.

56. Four 10F capacitors are connected in series, calculate the equivalent capacitance.

- (A) 1.5F (B) 2.5F
(C) 3.5F (D) 0.5F

Answer: - Option B

Explanation: - When capacitors are connected in series,
 $1/C_{\text{total}} = 1/C_1 + 1/C_2 + 1/C_3 + 1/C_4 = 1/10 + 1/10 + 1/10 + 1/10 = 4/10 \text{ F.}$
 $C_{\text{total}} = 10/4 = 2.5\text{F}$

57. The total voltage drop across a series of capacitors is

- (A) The voltage drop across any one of the capacitor
(B) The sum of the voltage drop across each of the capacitors
(C) The product of the voltage drop across each of the capacitors
(D) Zero

Answer: - Option B

Explanation: - The total voltage drop across a series of capacitors is equal to the sum of the voltage drop across each of the capacitors because when capacitors are connected in series, the voltage drops across each capacitor.

58. Capacitors C_1 , C_2 and C_3 have voltage drops 2V, 3V and 5V respectively. Calculate the total voltage in the circuit.

- (A) 10V (B) 2V
(C) 5V (D) 0V

Answer: - Option A

Explanation: - When capacitors are connected in series: $V_{\text{total}} = V_1 + V_2 + V_3 = 2 + 3 + 5 = 10\text{V.}$

59. When capacitors are connected in series, which of the following rules are applied?

- (A) Voltage divider (B) Current divider
(C) Both voltage divider and current divider (D) Neither voltage divider nor current divider

Answer: - Option A

Explanation: - Voltage divider is the rule applied when capacitors are connected in series because when capacitors are connected in series, the voltage is different across each capacitor.

60. A capacitor does not allow sudden changes in

- (A) Current (B) Voltage
(C) Resistance (D) Inductance

Answer: - Option B

Explanation: - Capacitor does not allow sudden changes in voltage because these changes occur in zero time which results in the current being infinity, which is not possible

61. Which of the following expressions is correct with respect to the voltage across capacitors in series?

- (A) $V_1 / V_2 = C_2 / C_1$ (B) $V_2 / V_1 = C_2 / C_1$
(C) $V_1 \times V_2 = C_1 \times C_2$ (D) $V_1 / C_1 = V_2 / C_2$

Answer: - Option A

Explanation: - When capacitors are connected in series, the charge across each capacitor remains the same whereas the voltage across each varies. When two capacitors are connected in series: $Q = V_1 C_1$; $Q = V_2 C_2$. Thus: $V_1 / V_2 = C_2 / C_1$.

62. Two 4F capacitors are connected in series, calculate the voltage across each if the total voltage is 20V.

- (A) 10V (B) 5V
(C) 20V (D) 0V

Answer: - Option A

Explanation: - The two capacitors have the same capacitance, hence the voltage gets divided equally. V across each = Total voltage / 2 = $20 / 2 = 10V$.

63. Two capacitors having voltage 2F and 4F are connected in series. This combination is connected to a 100V supply, calculate the voltage across the 2F capacitor.

- (A) 66.67V (B) 33.33V
(C) 100V (D) 0V

Answer: - Option A

Explanation: - $C_{total} = 2 \times 4 / (2 + 4) = 4/3F$, $Q = CV = (4/3) \times 100 = 400/3 C$.
 V across 2F capacitor = $Q/C = (400/3) / 2 = 200/3 = 66.67V$

64. Work done in charging a capacitor is

- (A) QV (B) $\frac{1}{2}QV$
(C) $2QV$ (D) QV^2

Answer: - Option B

Explanation: - We know that work done = $Q^2 / 2C$. Substituting C as Q/V , we get work done = $Q/2V$.

65. Energy stored in 2000mF capacitor charged to a potential difference of 10V is?

- (A) 100J (B) 200J
(C) 300J (D) 400J

Answer: - Option A

Explanation: - : From the expression: $U = CV^2/2 = 100J$

66. When do we get maximum energy from a set of capacitors?

- (A) When they are connected in parallel (B) When they are connected in series
(C) Both in series and parallel (D) Insufficient information provided

Answer: - Option A

Explanation: - : We get maximum energy when capacitors are connected in parallel because the equivalent capacitance is larger than the largest individual capacitance when connected in parallel. The relation between capacitance and energy is: $Energy = CV^2/2$, hence as the capacitance increases, the energy stored in it also increases.

67. If the charge stored in a capacitor is 4C and the value of capacitance is 2F, calculate the energy stored in it.

- (A) 2J (B) 4J
(C) 8J (D) 16J

Answer: - Option B

Explanation: - The expression for finding the value of energy is: $U = Q^2/2C = 4 \times 4 / (2 \times 2) = 4J$

68. If the charge in a capacitor is 4C and the energy stored in it is 4J, find the value of capacitance.

- (A) 2F (B) 4F
(C) 8F (D) 16F

Answer: - Option A

Explanation: - The expression for finding the value of energy is: $U = Q^2/2C$. Substituting the values of U and Q, we get $C = 2F$.

69. If the charge in a capacitor is 4C and the energy stored in it is 4J, calculate the voltage across its plates.

- (A) 2V (B) 4V
(C) 8V (D) 16V

Answer: - Option A

Explanation: - The expression for finding the value of energy is: $U = Q^2 / 2C$. Substituting the values of U and Q, we get $C = 2F$; $V = Q/C$, hence $V = 4/2 = 2V$

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02 – Radioactivity and Ultrasonic Waves

Marks:- 14

Content of Chapter:-

- 2.1 Radioactivity, α , β and γ particles/rays and their properties
- 2.2 Radioactive decay law, half-life period
- 2.3 Sound waves, amplitude, frequency, time - period wave-length and velocity of wave, relation between velocity, frequency and time -period of wave
- 2.4 Ultrasonic waves, properties of ultrasonic waves
- 2.5 Piezo-electric effect. Piezo materials: Types: Natural: Quartz, Synthetic: Gallium Orthophosphate
- 2.6 Generation of ultrasonic waves using Piezo electric effect
- 2.7 Applications of ultrasonic waves
- 2.8 Doppler Effect and its applications.

1. The process by which an unstable atomic nucleus losses energy by emitting radiations, such as radiations is known as

- (A) Photoelectric emission
- (B) thermo emission
- (C) radioactivity
- (D) LASER

Answer:- Option C

Explanation:- Definition of Radioactivity.

2. The process of spontaneous emission of radioactive substance is known as.....

- (A) Photoelectric emission
- (B) Thermo emission
- (C) Radioactivity
- (D) LASER

Answer:- Option C

Explanation:- Definition of Radioactivity.

3. Which of the following is not an example of radioactive substance-----

- (A) Uranium
- (B) Radium
- (C) Thorium
- (D) Calcium

Answer:- Option D

Explanation:- Calcium is not radioactive substance.

4. Which of the following is not an example of radioactive substance?

- (A) Polonium
- (B) Boron
- (C) Radon
- (D) Actinium

Answer:- Option B

Explanation:- Boron is not radioactive substance.

5. All naturally occurring element whose atomic number are greater than _____ are radioactive.

- (A) 12
- (B) 32
- (C) 52
- (D) 82

Answer:- Option D

Explanation:- 82.

6. Doubly ionized helium atoms are _____

- (A) α Particles (B) β particles
(C) None (D) Photons

Answer:- Option A

Explanation:- Doubly ionized helium atoms are alpha particles.

7. Which of the following is not a property of radioactive radiation?

- (A) Highly penetrating (B) Affect photographic plate
(C) Produce scintillations on florescent screen (D) Produce elasticity

Answer:- Option D

Explanation:- Elasticity is not the property of radioactive radiation.

8. The emission of radiation from radioactive element is _____ process.

- (A) Instantaneous (B) Short time
(C) Not instantaneous i.e. prolonged (D) Momentary

Answer:- Option A

Explanation:- The emission of radiation is an instantaneous process.

9. The mass of α -Particles is _____

- (A) $6.645 \times 10^{-27} kg$ (B) $6.645 \times 10^{27} kg$
(C) $2.2 \times 10^{-10} kg$ (D) $2.2 \times 10^{10} kg$

Answer:- Option A

Explanation:- The mass of α -particle is $6.645 \times 10^{-27} kg$.

10. The charge on α -Particles is _____

- (A) $3.2 \times 10^{19} C$ (B) $3.2 \times 10^{-19} C$
(C) $3.2 \times 10^{14} C$ (D) $3.2 \times 10^{-14} C$

Answer:- Option B

Explanation:- The charge on α -Particles is $3.2 \times 10^{-19} C$.

11. α -Particles are represented as _____

- (A) ${}_1\text{He}^2$ (B) ${}_2\text{He}^3$
(C) ${}_2\text{He}^4$ (D) ${}_2\text{He}^2$

Answer:- Option C

Explanation:- α -Particles are represented as ${}_2\text{He}^4$

12. X-rays are _____

- (A) negatively charged (B) positively charged
(C) neutral (D) none of these

Answer:- Option C

Explanation:- X-rays are neutral.

13. γ -rays are _____

- (A) positively charged (B) negatively charged
(C) neutral (D) none of these

Answer:- Option C

Explanation:- γ -rays are neutral.

14. The spontaneous breaking up of the nucleus is known as-----

- (A) radioactive disintegration (B) radioactive integration
(C) fusion (D) refusion

Answer:- Option A

Explanation:- The spontaneous breaking of the nucleus is known as radioactive disintegration.

15. When radioactive element emits α -particle then it converts into other element with mass number _____ and atomic number _____

- (A) less by 2, less by 1 (B) more by 4, more by 1
(C) less by 4, less by 2 (D) more by 4, more by 2

Answer:- Option C

Explanation:- As α -particle is represented as ${}^2_2\text{He}^4$

16. As per law of radioactive disintegration (decay), the number of atoms that disintegrate in one second (per second) is _____ to the number of remaining radioactive atoms.

- (A) directly proportional (B) inversely proportional
(C) not proportional (D) equal

Answer:- Option A

Explanation:- Statement of law of radioactive disintegration.

17. Radioactive disintegration equation is _____

- (A) $dt/t = -\lambda dN$ (B) $dt/dt = -\lambda dN$
(C) $dN/N = \lambda dt$ (D) $dN/N = -\lambda dt$

Answer:- Option D

Explanation:- Radioactive disintegration equation is $dN/N = -\lambda dt$

18. Radioactive disintegration equation is _____

- (A) $t = t_0 e^{-\lambda N}$ (B) $t = t_0 e^{\lambda N}$
(C) $N = N_0 e^{-\lambda t}$ (D) $N = N_0 e^{\lambda t}$

Answer:- Option C

Explanation:- Radioactive disintegration equation is $N = N_0 e^{-\lambda t}$

19. The number of radioactive substance decreases _____ with time.

- (A) exponentially (B) linearly
(C) speedily (D) slowly

Answer:- Option A

Explanation:- Nature of graph.

20. The ratio of amount of radioactive substance disintegrated in unit time to the amount of substance present is called _____

- (A) Rutherford constant (B) radioactive decay constant
(C) Rutherford's ratio (D) Soddy's constant

Answer:- Option B

Explanation:- $dN/N = -\lambda dt$

22. The decay constant is defined as the reciprocal of that time duration in which the number of atoms of radioactive substance falls to _____ of its original value.

- (A) 12% (B) 25%
(C) 37% (D) 50%

Answer:- Option C

Explanation:- The definition of decay constant.

21. The time in which half of the radioactive substance is disintegrated is called as _____

- (A) reduced life (B) life time
(C) double life period (D) half-life period

Answer:- Option D.

Explanation:- The definition of half life constant.

22. Half-life period of radioactive substance is given by $T_{1/2}$ is equal to _____

- (A) $0.693/\lambda$ (B) $\lambda/0.693$
(C) $\lambda/2$ (D) $2/\lambda$

Answer:- Option A

Explanation:- $T_{1/2} = 0.693/\lambda$

23. Longitudinal sound wave travel in the form of alternate _____

- (A) Crest and trough (B) compression and rarefactions
(C) crest and compression (D) trough and rarefaction

Answer:- Option B

Explanation:- Longitudinal sound wave travel in the form of alternate compression and rarefactions.

24. The maximum displacement of particle (in S.H.M.) from its mean position is called as _____

- (A) frequency (B) period
(C) wavelength (D) amplitude

Answer:- Option D

Explanation:- The definition of amplitude.

25. The number of oscillations performed by a particle (in S.H. M.) in one second is called _____ of oscillation.

- (A) Frequency (B) period
(C) wavelength (D) amplitude

Answer:- Option D

Explanation:- The definition of frequency.

26. The time taken by a particle to complete one oscillation is called as _____ Of oscillation.

- (A) frequency (B) period
(C) wavelength (D) amplitude

Answer:- Option B

Explanation:- It is a definition of period.

27. The distance between the center of two successive compressions is called as _____

- (A) frequency (B) wavelength
(C) amplitude (D) none of these

Answer:- Option B

Explanation:- It is a definition of wavelength.

28. The distance covered by the disturbance or wave in one second called as _____ of wave.

- (A) frequency (B) period
(C) wavelength (D) velocity

Answer:- Option D

Explanation:- It is definition of velocity of wave.

29. The relation between velocity, frequency and wavelength is _____

- (A) $n = v \lambda$ (B) $v = n \lambda$
(C) $v = n/\lambda$ (D) $v = \lambda/n$

Answer:- Option B

Explanation:- $v = n \lambda$

30. The relation between velocity, period and wavelength is.....

- (A) $\lambda = v/T$ (B) $v = T/\lambda$
(C) $v = \lambda/T$ (D) $T = v \lambda$

Answer:- Option C

Explanation:- Since $v = n \lambda$ and $n = 1/T$ therefore $v = \lambda/T$

31. Ultrasonic are the sound waves having frequency _____

- (A) more than 20 kHz (B) more than 20 Hz
(C) less than 20 Hz (D) less than 20 kHz

Answer:- Option A

Explanation:- Sound waves with a frequency of 20 kHz and higher are referred to as ultrasound.

32. The sound wave of frequency less than 20 Hz are known as _____

- (A) infrasonic (B) audible sound
(C) ultrasonic (D) supersonic

Answer:- Option A

Explanation:- The sound wave of frequency less than 20 Hz are known as infrasonic.

33. The sound wave of frequency between 20 Hz to 20 kHz is known as _____

- (A) infrasonic (B) audible sound
(C) ultrasonic (D) supersonic

Answer:- Option B

Explanation:- Range of audible sound is 20Hz to 20kHz.

34. The sound wave of frequency more than 20 Hz are known as _____

- (A) infrasonic (B) audible sound
(C) ultrasonic (D) supersonic

Answer:- Option C

Explanation:- Definition of ultrasonic waves.

35. Which of the following is not a piezo-electric material?

- (A) quartz (B) Rochelle Salt
(C) topaz (D) Uranium

Answer:- Option A

Explanation:- Quartz is a piezo-electric material.

36. The normal healthy human ear can hear the sound wave of frequency _____

- (A) less than 20 Hz (B) 20 Hz to 20kHz
(C) more than 20 kHz (D) more than 50kHz

Answer:- Option B

Explanation:- Range of audible sound for healthy human ear is 20Hz to 20kHz.

37. Sound waves are

- (A) Longitudinal (B) Transverse
(C) Electromagnetic (D) Only magnetic

Answer:- Option A

Explanation:- Sound waves are longitudinal in nature.

38. A tuning fork vibrates with a frequency of 512Hz if the velocity of the wave is 330m/s, distance travelled in 5 vibrations will be _____

- (A) 1.2m (B) 3.2m
(C) 5.2m (D) 7.2m

Answer:- Option B

Explanation:- $v = n\lambda$ therefor, $\lambda = \frac{v}{n} = \frac{330}{512} = 0.645m$

Since distance covered in one vibration is λ . Therefore distance covered in five vibrations,
 $5\lambda = 5 \times 0.645 = 3.225m$

39. A siren producing a pitch of 330Hz is moving towards the observer with a velocity of 150m/s The velocity of sound is 330m/s The frequency of sound heard by a stationary observer is _____

- (A) 550Hz (B) 600Hz
(C) 605Hz (D) 700Hz

Answer:- Option C

Explanation:- $n_a = n_0 \left(\frac{v+v_0}{v-v_s} \right) = 330 \left(\frac{330+0}{330-150} \right) = 605Hz$

40. A tuning fork of frequency 90 Hz is sounded and moved towards stationary observer with a velocity equal to (1/10)th of the velocity of sound, the note heard by the observer will have frequency _____

- (A) 25Hz (B) 50Hz
(C) 75Hz (D) 100Hz

Answer:- Option D

Explanation:- $n_a = n_0 \left(\frac{v+v_0}{v-v_s} \right) = 90 \left(\frac{330+0}{330-33} \right) = 100Hz$

41. An observer is moving towards siren of frequency 400Hz with a velocity of 150m/s The velocity of sound is 330m/s The frequency of sound heard by observer will be _____

- (A) 581.8Hz (B) 540Hz
(C) 600.5Hz (D) 620.5Hz

Answer:- Option A

Explanation:- $n_a = n_0 \left(\frac{v+v_0}{v-v_s} \right) = 400 \left(\frac{330+150}{330} \right) = 581.8Hz$

42. A siren producing a pitch of 330Hz is moving away from stationary observer with a velocity of 100m/s The velocity of sound is 330m/s, The pitch of sound heard by observer is _____

- (A) 120Hz (B) 180Hz
(C) 253.2Hz (D) 260.5Hz

Answer:- Option C

Explanation:- $n_a = n_0 \left(\frac{v-v_0}{v+v_s} \right) = 330 \left(\frac{330-0}{330+100} \right) = 253.2Hz$

43. An observer is moving away from siren of frequency 350Hz with a velocity of 150m/s The velocity of sound is 330m/s The frequency of sound heard by observer will be _____

- (A) 125.50Hz (B) 150.25Hz
(C) 175.5Hz (D) 190.9Hz

Answer:- Option

Explanation:- $n_a = n_0 \left(\frac{v-v_0}{v+v_s} \right) = 350 \left(\frac{330-150}{330+0} \right) = 190.9Hz$

44. A siren producing a frequency of 400Hz is moving towards observer with a velocity of 100m/s and an observer is moving towards siren with a velocity of 50m/s The velocity of sound is 330m/s

The frequency of sound heard by observer will be _____

- (A) 555.5Hz (B) 575.5Hz
(C) 660.86Hz (D) 725.5Hz

Answer:- Option C

Explanation:- $n_a = n_0 \left(\frac{v+v_o}{v-v_s} \right) = 400 \left(\frac{330+50}{330-100} \right) = 660.86\text{Hz}$

45. A siren producing a frequency of 400Hz is moving away from the observer with a velocity of 50m/s and the observer is moving away from the siren with a velocity of 100m/s The Velocity of sound is 330m/s The frequency of sound heard by observer will be _____

- (A) 180Hz (B) 200Hz
(C) 220Hz (D) 242Hz

Answer:- Option

Explanation:- $n_a = n_0 \left(\frac{v-v_o}{v+v_s} \right) = 400 \left(\frac{330-100}{330+50} \right) = 242.1\text{Hz}$

46. If sound source and observer both are stationary then apparent frequency _____ true frequency.

- (A) is more than (B) is less than
(C) is equal to (D) is less than or equal to

Answer:- Option C

Explanation:- As source and observer both are stationary there will not be Doppler effect.

47. If sound source or observer or both are moving towards each other then apparent frequency ____ true frequency.

- (A) is more than (B) is less than
(C) is equal to (D) is less than or equal to

Answer:- Option A

Explanation:- Doppler effect.

48. If sound source or observer or both are moving away from each other then apparent frequency _____ true frequency.

- (A) is more than (B) is less than
(C) is equal to (D) is less than or equal to

Answer:- Option B

Explanation:- Doppler effect.

49. A tuning fork of frequency 480 Hz produces a wave of 68 cm, velocity of sound in air will be _____

- (A) 235.5m/s (B) 280.82m/s
(C) 326.4 m/s (D) 420.20m/s

Answer:- Option C

Explanation:- $v = n\lambda = 480 \times 68 \times 10^{-2} = 326.4\text{m/s}$

50. Atoms with same number of neutrons, but different number of nucleons are called

- (A) Isobars (B) Isotones
(C) Isotopes (D) Isoters

Answer:- Option B

Explanation:- Atoms with same number of neutrons, but different number of nucleons are called Isotones.

51. Percentage of U-238 in natural uranium is around

- (A) 29.71 (B) 99.29
(C) 0.015 (D) 0.71

Answer:- Option C

Explanation: Natural Uranium contains around 0.015% of U-238.

52. A radioactive isotope undergoes decay with respect to time following _____ law

- (A) logarithmic (B) exponential
(C) inverse square (D) linear

Answer:- Option B

Explanation: A radioactive isotope undergoes decay with respect to time following exponential law.

53. U-235 content in enriched uranium, that is normally used in power reactors (e.g. at Tarapur atomic power plant) is about _____ percent.

- (A) 50 (B) 3
(C) 85 (D) 97

Answer:- Option B

Explanation: U-235 content in enriched uranium, that is normally used in power reactors (e.g. at Tarapur atomic power plant) is about 3 percent.

54. The half-life period of a radioactive element is 100 days. After 400 days, one gm of the element will be reduced to _____ gm.

- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$
(C) $\frac{1}{8}$ (D) $\frac{1}{16}$

Answer:- Option D

Explanation:- The half-life period of a radioactive element is 100 days. After 400 days, one gm of the element will be reduced to $\frac{1}{16}$ gm.

55. Who of the following is associated with radioactivity?

- (A) Henry Becquerel (B) Isaac Newton
(C) Albert Einstein (D) C. V. Raman

Answer:- Option A

Explanation:- Henry Becquerel is associated with radioactivity.

56. Half-life period of a radioactive element is given by $T = \frac{0.693}{\lambda}$ where all symbols have usual meanings.

- (A) $0.693/\lambda$ (B) 0.693λ
(C) $0.693/N$ (D) $0.693 N$

Answer:- Option A

Explanation:- $T = 0.693/\lambda$

57. Which of the following statement is not true?

- (A) When the observer moves away from the stationary source, then the pitch of sound decreases
(B) When the observer moves towards the stationary source, then the pitch of sound increases
(C) When the source moves away from stationary observer then the pitch of the sound decreases
(D) When the source moves towards the stationary observer then the pitch of the sound decreases

Answer:- Option D

Explanation:- When the source moves towards the stationary observer then the pitch of the sound increases.



03 – Photo electricity, X-ray, LASER

Marks:- 12

Content of Chapter:-

- 3.1 Plank's hypothesis, properties of photons, photo electric effect, threshold frequency, threshold wavelength, stopping potential, work function, characteristics photoelectric effect, Einstein's photoelectric equation.
- 3.2 Photoelectric cell and LDR: Principle, working and Applications.
- 3.3 Production of X-rays by modern Coolidge tube, properties and application.
- 3.4 Laser: Properties, absorption, spontaneous and stimulated emission, application of laser.
- 3.5 Population inversion, active medium, optical pumping, three energy level system, He - Ne Laser

01. When light of suitable frequency is incident on metallic surface, the electrons are emitted from metal surface, this effect is

- (A) Photoelectric effect
- (B) Thermoelectric effect
- (C) Heating effect of electric current
- (D) Seebeck effect

Answer: - Option A

Explanation: - When light of suitable frequency is incident on metallic surface, the electrons are emitted from metal surface, this effect is Photoelectric effect.

02. According to Planck's theory, Energy is not emitted or absorbed continuously, but in discrete packets. These energy packets are called as

- (A) Electrons
- (B) Protons
- (C) Photons
- (D) Neutrons

Answer: - Option C

Explanation: - According to Planck's theory, Energy is not emitted or absorbed continuously, but in discrete packets. These energy packets are called as Photons

03. Light can behave

- (A) like a wave
- (B) Like a particle
- (C) both wave & particle
- (D) None of these

Answer: - Option C

Explanation: - Light can behave both wave & particle

04. Photons are electrically

- (A) Positive
- (B) Negative
- (C) Neutral
- (D) None of these

Answer: - Option C

Explanation: - Photons are electrically Neutral. They have no charge upon them.

05. Photons travel with a speed

- (A) Positive
- (B) less than speed of light
- (C) more than speed of light
- (D) equal to that of light.

Answer: - Option D

Explanation: - Photons are the particles of light. Hence have same speed as that of light.

06. Energy of photon is given by,

- (A) $E = h/\nu$ (B) $h = E/\nu$
(C) $E = h+\nu$ (D) $E = h\nu$

Answer: - Option D

Explanation: - Formula of energy associated to a photon having frequency ' ν '.

07. Which of the following is a correct relation between ν and λ ?

- (A) $c = \nu + \lambda$ (B) $\nu = c/\lambda$
(C) $c = \nu\lambda$ (D) $\lambda = c\nu$

Answer: - Option C

Explanation: - It's a formula.

08. Which of the following is a correct relation between ν and c ?

- (A) $c = \nu + \lambda$ (B) $\nu = c/\lambda$
(C) $\nu = c\lambda$ (D) $\lambda = c\nu$

Answer: - Option B

Explanation: - It's a formula.

09. The energy of photon of wavelength λ is

- (A) $E = h\lambda/c$ (B) $E = h/c\lambda$
(C) $E = hc + \lambda$ (D) $E = hc/\lambda$

Answer: - Option D

Explanation: - Because, $\nu = c/\lambda$.

10. The ratio of photon energy to its frequency is,

- (A) Planck's constant (B) Poisson's ratio
(C) Joule's constant (D) Stake's constant

Answer: - Option A

Explanation: - $E/\nu = h$ (because, $E = h\nu$)

11. The value of h is,

- (A) 3.36×10^{-34} Js (B) 6.63×10^{-34} Js
(C) 6.63×10^{-27} Js (D) None of these

Answer: - Option B

Explanation: - $h = 6.63 \times 10^{-34}$ Js

12. Photon is

- (A) Indivisible entity (B) Divisible entity
(C) Electrically positive (D) Electrically negative

Answer: - Option A

Explanation: - Photon is the smallest possible particle of the light.

13. Photons are,

- (A) Deflected by magnetic field (B) Deflected by electric field
(C) Do not ionize (D) Ionize

Answer: - Option C

Explanation: - Photons do not ionize the material medium.

14. As per Einstein's theory of relativity,

- (A) $E=mc^2$ (B) $E=mc^2$
(C) $E=mc$ (D) $E=m/c$

Answer: - Option B

Explanation: - It is the famous equation in relativity by Einstein - $E=mc^2$

15. The rest mass of photon of frequency (ν) is,

- (A) $m = h\nu/c$ (B) $m = hc/\nu$
(C) $m = h\nu/c^2$ (D) $m = h\nu^2/c$

Answer: - Option C

Explanation: - $E = mc^2 = h\nu$.

16. The mass of photon of wavelength (λ) is,

- (A) $m=hc\lambda$ (B) $m=hc/\lambda$
(C) $m=\lambda/hc$ (D) $m=h/\lambda c$

Answer: - Option D

Explanation: - $m = h\nu/c^2$
But, $\nu = c/\lambda$
Hence, $m=h/\lambda c$

17. The emission of Photoelectron takes place is

- (A) $\nu < \nu_0$ (B) $\nu > \nu_0$
(C) $\nu_0 > \nu$ (D) ν not equal to ν_0

Answer: - Option C

Explanation: - The emission of Photoelectron takes place for the frequencies (ν) greater than threshold frequency (ν_0)

18. The amount of energy required to separate the electron from atom is called as

- (A) Kinetic energy (B) Potential energy
(C) Photoelectric work function (D) Light energy

Answer: - Option C

Explanation: - The amount of energy required to separate the electron from atom is called as Photoelectric work function.

19. The value of Photoelectric work function depends on,

- (A) Nature of metal (B) Speed of photons
(C) Medium (D) Area of metal plate

Answer: - Option A

Explanation: - The value of Photoelectric work function depends on nature of metal.

20. Threshold frequency of a metal is the _____ frequency of incident light at which

- (A) minimum, emission does not take place (B) Maximum, emission not take place
(C) minimum, emission just begin (D) maximum, emission just begin

Answer: - Option C

Explanation: - Threshold frequency of a metal is the minimum frequency of incident light at which emission just begins.

21. The value of photoelectric work function & threshold frequency changes from

- (A) Place to place (B) Time to time
(C) One point to other (D) Metal to metal

Answer: - Option B

Explanation: - The value of photoelectric work function & threshold frequency changes from metal to metal

22. The negative potential given to cell at which photoelectric current becomes zero is

- (A) Photopotential (B) Stopping potential
(C) Light potential (D) zero potential

Answer: - Option B

Explanation: - The negative potential given to cell at which photoelectric current becomes zero is stopping potential.

23. Photoelectric current is directly proportional to

- (A) Speed of photon (B) Energy of photon
(C) Frequency of light (D) Intensity of incident light

Answer: - Option D

Explanation: - Photoelectric current is directly proportional to intensity of light.

24. The velocity of photoelectron is directly proportional to

- (A) Speed of photon (B) Temperature of metal
(C) Frequency of light (D) Intensity of incident light

Answer: - Option C

Explanation: - The velocity of photoelectron is directly proportional to frequency of light

25. What is the effect of intensity on the stopping potential?

- (A) As intensity increases, stopping potential increases linearly
(B) As intensity increases, stopping potential decreases linearly
(C) As intensity decreases, stopping potential increases exponentially effect (D) No

Answer: - Option D

Explanation: - Stopping potential does not depend upon the intensity of light. It depends upon frequency of light.

26. During Einstein's Photoelectric Experiment, what changes are observed when the frequency of the incident radiation is increased?

- (A) The value of stopping potential increases (B) No effect
(C) The value of saturation current increases (D) The value of stopping potential decreases

Answer: - Option A

Explanation: - Stopping potential depends upon frequency of light.

27. Which of the following is not a characteristic of photoelectric effect?

- (A) The process is instantaneous (B) Emission takes place only if $\nu > \nu_0$
(C) Rate of emission directly prop. To temp(T) (D) photoelectric current directly prop to intensity of light

Answer: - Option B

Explanation: - Emission starts when incident frequency (ν) is more than threshold frequency (ν_0).

28. Einstein's photoelectric equation is given by,

- (A) $\frac{1}{2}mv^2 = h(\nu - \nu_0)$ (B) $\frac{1}{2}mv^2 = 2h(\nu - \nu_0)$
(C) $\frac{1}{2}mv^2 = h(\nu_0 - \nu)$ (D) $\frac{1}{2}mv^2 = h/(\nu - \nu_0)$

Answer: - Option A

Explanation: - Equation in option A is correct.

29. Out of the following which is correct Einstein's photoelectric equation?

- (A) $\frac{1}{2}mv^2 = h(v - v_0)$ (B) $\frac{1}{2}mv^2 = 2h(v - v_0)$
(C) $\frac{1}{2}mv^2 = h(v_0 - v)$ (D) $\frac{1}{2}mv^2 = h/(v - v_0)$

Answer: - Option A

Explanation: - Equation in option A is correct.

30. The maximum K.E of photoelectrons depends on

- (A) Intensity & Frequency both (B) Stopping potential
(C) Frequency of light (D) Intensity of incident light

Answer: - Option C

Explanation: - It depends upon frequency of light.

31. In Einstein's photoelectric equation $\frac{1}{2}mv^2 = h(v - v_0)$ if $v < v_0$ then,

- (A) emission just begins (B) emission takes place
(C) No emission (D) rate of emission is high

Answer: - Option C

Explanation: - In such case emission does not take place.

32. In Einstein's photoelectric equation $\frac{1}{2}mv^2 = h(v - v_0)$ if $v = v_0$ then,

- (A) Emission just begins (B) emission just begins
(C) No emission (D) rate of emission is high

Answer: - Option A

Explanation: - When incident frequency (v) is equal to threshold frequency (v_0) emission just begins.

33. In Einstein's photoelectric equation $\frac{1}{2}mv^2 = h(v - v_0)$ if $v > v_0$ then

- (A) emission just begins (B) emission takes place
(C) No emission (D) rate of emission is high

Answer: - Option B

Explanation: - In this case emission takes place with ease.

34. Unit of threshold frequency is

- (A) Hz (B) radian
(C) per second (D) Both A and C

Answer: - Option D

Explanation: - Unit of frequency is Hz (hertz) or per second

35. Which of the following is not application of photocell

- (A) Burglar alarm (B) Lux meter
(C) Automatic street light controller (D) Cancer cure

Answer: - Option D

Explanation: - For cancer cure we use X-rays.

36. The type of light used in burglar alarm is,

- (A) IR light (B) X rays
(C) UV rays (D) Visible light

Answer: - Option A

Explanation: - Infrared light is used in burglar alarm.

37. The principle of LDR is

- (A) resistance decreases as intensity of light increases
(B) resistance increases as intensity of light increases

- (C) resistance increases as frequency of light increases
- (D) Number of photoelectrons increases with intensity

Answer: - Option A

Explanation: - Resistance of LDR decreases with increasing intensity of light.

38. Which of the following is not application of LDR?

- (A) Security alarm
- (B) smoke detector
- (C) dental surgery
- (D) street light control

Answer: - Option C

Explanation: - LDRs are not used in dental surgeries.

39. The energy of photoelectron is 2.4 eV. Its frequency will be,

- (A) 2.4×10^{14} Hz
- (B) 5.79×10^{14} Hz
- (C) 8×10^{14} Hz
- (D) 8×10^{14} Hz

Answer: - Option B

Explanation: - $1\text{eV} = 1.6 \times 10^{-19}$ J

$$\text{Hence, } 2.4\text{eV} = 2.4 \times 1.6 \times 10^{-19} \text{ J} = 3.84 \times 10^{-19} \text{ J}$$

$$E = hv$$

$$v = E/h = 3.84 \times 10^{-19} / 6.63 \times 10^{-34}$$

$$v = 0.579 \times 10^{15}$$

$$v = 5.79 \times 10^{14} \text{ Hz}$$

40. The photoelectric work function of a metal is 6×10^{-19} J. Its threshold frequency will be,

- (A) 2×10^{14} Hz
- (B) 6×10^{14} Hz
- (C) 9×10^{14} Hz
- (D) 12×10^{14} Hz

Answer: - Option C

Explanation: - work function = 6×10^{-19} J

$$v_0 = \text{work function} / h = 6 \times 10^{-19} / 6.63 \times 10^{-34}$$

$$v_0 = 0.905 \times 10^{15} \text{ Hz}$$

$$v_0 = 9.05 \times 10^{14} \text{ Hz}$$

41. Calculate threshold frequency of metal, if the work function of metal is 6eV.

- (A) 14.4×10^{14} Hz
- (B) 14.4×10^{14} Hz
- (C) 32.2×10^{14} Hz
- (D) 32.2×10^{15} Hz

Answer: - Option A

Explanation: - work function = $6\text{eV} = 6 \times 1.6 \times 10^{-19} \text{ J} = 9.6 \times 10^{-19} \text{ J}$

$$v_0 = \text{work function} / h = 9.6 \times 10^{-19} / 6.63 \times 10^{-34}$$

$$v_0 = 1.44 \times 10^{15} \text{ Hz}$$

$$v_0 = 14.4 \times 10^{14} \text{ Hz}$$

42. Threshold frequency of metal is 1.2×10^{15} Hz. Its threshold wavelength is

- (A) 6×10^{-7} m
- (B) 6×10^7 m
- (C) 2.5×10^7 m
- (D) 2.5×10^{-7} m

Answer: - Option D

Explanation: - $c = v_0 \lambda_0$

$$\lambda_0 = c / v_0$$

$$\lambda_0 = 3 \times 10^8 / 1.2 \times 10^{15}$$

$$\lambda_0 = 2.5 \times 10^{-7} \text{ m}$$

43. Threshold wavelength of metal is 3800Å. Its photoelectric work function is

- (A) 5.2×10^{-19} J (B) 12×10^{-19} J
(C) 7.2×10^{-19} J (D) 9.5×10^{-19} J

Answer: - Option A

Explanation: - $\lambda_0 = 3800 \times 10^{-10}$ m

$$\text{Work function} = h\nu_0 = hc / \lambda_0$$

$$\text{work function} = 6.63 \times 10^{-34} \times 3 \times 10^8 / 3800 \times 10^{-10}$$

$$\text{work function} = 0.00523 \times 10^{-16}$$

$$\text{work function} = 5.23 \times 10^{-19} \text{ J}$$

44. The photoelectric work function of a metal is 2×10^{-19} J. Its threshold frequency will be,

- (A) 3×10^{12} Hz (B) 3×10^{13} Hz
(C) 3×10^{14} Hz (D) 3×10^{15} Hz

Answer: - Option C

Explanation: - work function = 2×10^{-19} J

$$\nu_0 = \text{work function} / h = 2 \times 10^{-19} / 6.63 \times 10^{-34}$$

$$\nu_0 = 0.301 \times 10^{15} \text{ Hz}$$

$$\nu_0 = 3.01 \times 10^{14} \text{ Hz}$$

45. The energy of photon is 6×10^{-19} J. Its wavelength is

- (A) 3.3×10^{-9} m (B) 3.3×10^{-8} m
(C) 3.3×10^{-6} m (D) 3.3×10^{-7} m

Answer: - Option

Explanation: - $E = 6 \times 10^{-19}$ J

$$E = h\nu$$

$$E = hc/\lambda$$

$$\lambda = hc/E = 6.63 \times 10^{-34} \times 3 \times 10^8 / 6 \times 10^{-19}$$

$$\lambda = 3.31 \times 10^{-7} \text{ m}$$

46. When fast moving electrons are suddenly stopped then ____ are produced

- (A) Laser (B) Current
(C) X-rays (D) None of these

Answer: - Option C

Explanation: - X-rays are produced when fast moving electrons are suddenly stopped.

47. In Coolidge X-ray tube, electrons are produced due to process known as

- (A) Photoelectric emission (B) Thermionic emission
(C) Ultrasonic emission (D) Hydraulic emission

Answer: - Option B

Explanation: - Thermionic emission is the emission of electrons from a heated metal (cathode). This principle was first used in the Coolidge tube and then later in the modern day x-ray tubes.

48. In the process of X-ray production, the intensity of X-rays can be controlled by

- (A) Adjusting filament current (B) Adjusting P.D. between cathode and anode
(C) Adjusting angle of target (D) Adjusting cooling rate

Answer: - Option B

Explanation: - The intensity of X-rays can be controlled by adjusting filament current as filament is producing the free electrons.

49. In the process of X-ray production, the penetration of X-rays (hard X-rays or soft X-rays) can be controlled by

- (A) Adjusting filament current (B) Adjusting P.D. between cathode and anode
(C) Adjusting angle of target (D) Adjusting cooling rate

Answer: - Option

Explanation: - In the process of X-ray production, the penetration of X-rays (hard X-rays or soft X-rays) can be controlled by adjusting P.D. between cathode and anode.

50. Which of the following is not a property of X-ray?

- (A) Have high penetrating power (B) Produce photoelectric effect
(C) Affect photographic plates (D) Get deflected by magnetic or electric fields

Answer: - Option D

Explanation: - X-rays are electrically neutral. Hence, cannot be deflected by magnetic or electric fields.

51. X-rays travel with the speed of light. X-rays produces ionization in the gases.....

- (A) True, True (B) True, False
(C) False, True (D) False, False

Answer: - Option B

Explanation: - X-rays have same speed as that of light. They do not ionize the gases.

52. Which of the following is not an application of X-Ray?

- (A) To detect crack in body of aero plane (B) to detect smuggling gold at airport
(C) Used as sensor in automation industry (D) to detect crack in bridge

Answer: - Option C

Explanation: - X-rays are not used as a sensor in automation industry.

53. Which of the following is not an application of X-Ray?

- (A) To detect crack in body (B) To treat tumors
(C) Used in eye surgery (D) To treat cancer

Answer: - Option C

Explanation: - X-rays cannot be used in eye surgery.

54. Calculate operating voltage of X ray tube which emits X-rays of wavelength 0.25Au.

- (A) 25kV (B) 30.6kV
(C) 35.7kV (D) 49.6kV

Answer: - Option D

Explanation: - $\lambda = 0.25\text{Au} = 0.25 \times 10^{-10} \text{ m}$

$$eV = hc / \lambda$$

$$V = hc / e\lambda$$

$$V = 6.63 \times 10^{-34} \times 3 \times 10^8 / 1.6 \times 10^{-19} \times 0.25 \times 10^{-10}$$

$$V = 49.72 \times 10^3 \text{ V}$$

$$V = 49.72 \times \text{K V}$$

55. Which of the following is a unique property of laser?

- (A) Directional (B) Single wavelength
(C) Coherence (D) All of them.

Answer: - Option D

Explanation: - All are the properties of a LASER.

56. Which of the following is not a property of laser?

- (A) Directional (B) Monochromatic
(C) Coherence (D) high penetrating power

Answer: - Option D

Explanation: - LASERs are not highly penetrating.

57. LASER stands for,

- (A) Light amplification by stimulated emission of radiation
(B) Light above stimulated emission of radiation
(C) Light amplification by stimulated electron refraction
(D) Light amplification by spontaneous emission of radiation

Answer: - Option A

Explanation: -Option A is correct.

58. In the process of spontaneous emission, atom makes transition from

- (A) ground state to excited state (B) Excited state to ground state
(C) low energy level to high energy level (D) None of these

Answer: - Option B

Explanation: - In the process of spontaneous emission, atom makes transition from excited state to ground state.

59. In the process of stimulated emission, atom makes transition from

- (A) ground state to excited state (B) Excited state to ground state
(C) low energy level to high energy level (D) None of these

Answer: - Option B

Explanation: - In the process of stimulated emission, atom makes transition from higher energy level (excited state) to lower energy level (ground level).

60. In the process of stimulated absorption, atom makes transition from

- (A) ground state to excited state (B) Excited state to ground state
(C) low energy level to high energy level (D) None of these

Answer: - Option C

Explanation: - During absorption the atom transits from low energy level to higher energy level.

61. What is the need to achieve population inversion?

- (A) To excite most of the atoms (B) To bring most of the atoms to ground state
(C) To achieve stable condition (D) To reduce the time of production of laser

Answer: - Option A

Explanation: - In order to excite most of the atoms one needs to achieve population inversion.

62. The relationship between N_1 and N_2 for stimulated emission to be dominant is

- (A) $N_1 = N_2$ (B) $N_1 > N_2$
(C) $N_2 > N_1$ (D) No such relationship

Answer: - Option C

Explanation: - N_2 (number of atoms in the excited state) must be more than N_1 (number of atoms in ground state)

63. During pumping, the atoms are excited to

- (A) Higher Excited States (B) Lower Energy states
(C) Meta Stable states (D) Not Excited

Answer: - Option A

Explanation: - During pumping, the atoms are excited to higher excited state.

64. In computer printers ____ laser is used.

- (A) He-Ne gas (B) ruby
(C) semiconductor (D) CO₂

Answer: - Option C

Explanation: - In computer printers semiconductor LASERS are used.

65. An atom remains in excited state for 10^{-8} seconds & comes to ground state immediately. This state is known as

- (A) Short excited state (B) Temporary excited state
(C) Metastable state (D) ordinary excited state

Answer: - Option B

Explanation: - When an atom remains in excited state for 10^{-8} seconds & comes to ground state immediately, this state is known as temporary excited state.

66. Which of the following is not application of LASER?

- (A) Engraving & embossing (B) Cutting & drilling metals
(C) Chemical analysis (D) Computer printer

Answer: - Option C

Explanation: - LASERS are not used for chemical analysis.

67. Making population of higher energy state more than ground state is

- (A) Population hiker (B) Population inversion
(C) Crowd maker (D) None of these

Answer: - Option B

Explanation: - The process is called as population inversion.

68. Proper Lasing action can be produced using

- (A) one level laser system (B) two level laser system
(C) three level laser system (D) None of these

Answer: - Option C

Explanation: - Proper Lasing action can be produced using three level laser system.

69. Appropriate Lasing action can be produced using,

- (A) one level laser system (B) two level laser system
(C) three level laser system (D) None of these

Answer: - Option A

Explanation: - Appropriate Lasing action can be produced using two level laser system.

70. He-Ne laser is a type of

- (A) Solid laser (B) Liquid laser
(C) Gas laser (D) None of these

Answer: - Option C

Explanation: - He-Ne laser is a gas laser as it contains gases (Helium and Neon).

71. Which pumping method is used in He-Ne laser?

- (A) Optical Pumping (B) Electrical Excitation
(C) Chemical Pumping (D) Direct Conversion

Answer: - Option B

Explanation: - In He-Ne LASER atoms are pumped by electrical excitation.

72. Which characteristic of LASER allows it to be used in holography?

- (A) Coherency
- (B) Directionality
- (C) Intensity
- (D) Monochromaticity

Answer: - Option A

Explanation: - Coherency is the important characteristic of LASER used in holography.

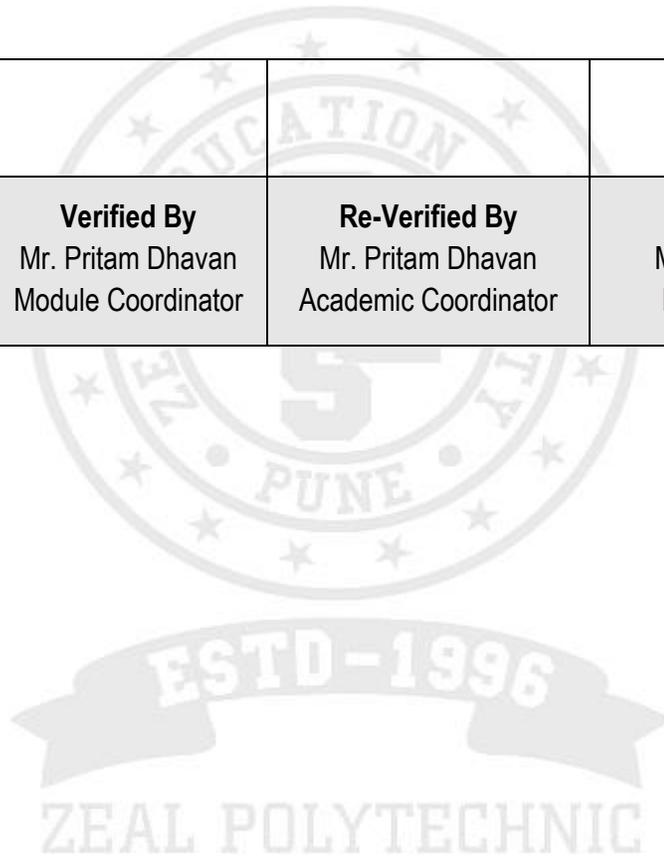
73. The relaxation time for metastable state is

- (A) 10 year
- (B) 1year
- (C) 100 to 10000 sec
- (D) 10^{-6} to 10^{-3} sec

Answer: - Option D

Explanation: - An atom can remain in metastable state for around 10^{-6} to 10^{-3} seconds.

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04 – WATER TREATMENT AND ANALYSIS

Marks:-11

Content of Chapter:-

- 4.1- Hardness; Classification,
- 4.2-Hard water in boilers. prevention: Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludges
- 4.3- Water softening: lime soda process (hot lime soda and cold lime soda process), zeolite process, ion exchange process.
- 4.4- Potable water treatment: Sedimentation, coagulation, filtration and sterilization.
- 4.5- Waste water treatment: sewage treatment, BOD and COD of sewage treatment, Reverse Osmosis, recycling of waste water.

Q.1. Hardness of water does not

- A. Make it fit for drinking.
- B. Make it fit for cooking
- C. Make it unfit for washing
- D. Make it unfit for drinking.

Answer: - Option D

Explanation: - Hard water is high in dissolved minerals, largely calcium and magnesium.

Q.2. Permanent hard water may be softened by passing it through

- A. Sodium bicarbonate
- B. Sodium hexametaphosphate
- C. Sodium silicate
- D. Sodium phosphate

Answer: - Option D

Explanation: - Permanent hard water may be softened by passing it through sodium hexametaphosphate

Q.3. Zeolite used in zeolite softening process for the treatment of hard water gets exhausted after certain time of usage but can be regenerated by flushing it with

- A. 10% Magnesium chloride solution
- B. 10% Sodium chloride solution
- C. 10% Magnesium sulfate solution
- D. 10% Calcium chloride solution

Answer: - Option B

Explanation: - Zeolite can be regenerated by using 10% Sodium chloride (brine solution) solution.

Q.4. Temporary hardness of water is caused by the presence of

- A. Carbonates of sodium and potassium
- B. Bicarbonates of calcium and magnesium
- C. Chlorides of calcium and magnesium
- D. Sulfates of calcium and magnesium

Answer: - Option B

Explanation: - Temporary hardness of water is caused by the presence of bicarbonates of calcium $[Ca(HCO_3)_2]$ and magnesium $Mg(HCO_3)_2$.

Q.5. The metallic constituents of hard water are

- A. Calcium, magnesium and iron
- B. Magnesium, tin and iron
- C. Iron, tin and calcium
- D. Magnesium, calcium and tin

Answer: - Option A

Explanation: - Calcium, magnesium and iron are the metallic constituents of hard water.

Q.6. Secondary treatment uses _____ to consume wastes.

- A. Chemicals
- B. Micro-organisms
- C. Filtration
- D. None of these

Answer: - Option B

Explanation: - Secondary treatment uses microorganisms to consume waste.

Q.7. Permanent hardness of water is caused by the presence of

- A. Phosphates of sodium and potassium
- B. Chlorides and sulfates of calcium and magnesium
- C. Carbonates of sodium and potassium
- D. Bicarbonates of calcium and magnesium

Answer: - Option B

Explanation: - Permanent hardness of water is caused by the presence of chlorides and sulfates of calcium and magnesium i.e. CaSO_4 , CaCl_2 , MgCl_2 , and MgSO_4

Q.8. Which of the following is NOT a property of hard water?

- A. It lathers easily with soap solution
- B. It is not good for steam generation
- C. It causes scale formation in kettles
- D. It has nice taste

Answer: - Option A

Explanation: - Hard water does not form good lather with soap solution.

Q.9. According to BIS the maximum permissible limit of dissolved solids in drinking water is

- A. 500 mg/l
- B. 1500 mg/l
- C. 1000 mg/l
- D. 2000 mg/l

Answer: - Option D

Explanation: - According to BIS the maximum permissible limit of dissolved solids in drinking water is 2000mg/l.

Q.10. At a water treatment plant, one of the stages involves passing water through a bed of sand and gravel. This stage of treatment is called as

- A. Sedimentation
- B. Sterilization
- C. Filtration
- D. Coagulation

Answer: - Option C

Explanation: - At a water treatment plant, one of the stages involves passing water through a bed of sand and gravel. This stage of treatment is called as filtration.

Q.11. What is the molecular formula of lime?

- A. $\text{Al}(\text{OH})_3$
- B. CaCO_3
- C. $\text{Mg}(\text{OH})_2$
- D. $\text{Ca}(\text{OH})_2$

Answer: - Option D

Explanation: - The molecular formula of lime is $\text{Ca}(\text{OH})_2$.

Q.12. One of the treatments of water for domestic use is to allow the water into large tanks where a flocculent (like alum) helps small particles to settle on the bottom. This method is known as

- A. Coagulation
- B. Sterilization
- C. Filtration
- D. Sedimentation

Answer: - Option A

Explanation: - Coagulation is the chemical water treatment process used to remove solids from water, where a flocculent (like alum) helps small particles to settle on the bottom.

Q.13. Which of the following chemical is sometime added in the process of coagulation and flocculation?

- A. Aluminum oxide
- B. Aluminum Sulfate
- C. Calcium chloride
- D. None of these

Answer: - Option B

Explanation: - Chemicals used for coagulation are aluminum sulfate, ferric sulfate or sodium aluminate.

Q.14. Zeolite softening process removes

- A. Dissolved gases in permanent hard water
- B. Both temporary and permanent hardness of water
- C. Only permanent hardness of water
- D. Only temporary hardness of water

Answer: - Option B

Explanation: - Zeolite softening process removes both temporary and permanent hardness of water.

Q.15. A Chemical which can act as coagulant and also softens the hard water is,

- A. Alum
- B. Sodium aluminate
- C. Soda
- D. Lime

Answer: - Option B

Explanation: - Chemicals used for coagulation are aluminum sulfate, ferric sulfate or sodium aluminate.

Q.16. The basis of reverse osmosis is

- A. Osmotic pressure is equal to hydrostatic pressure
- B. Osmotic pressure does not exist
- C. Osmotic pressure is greater than hydrostatic pressure
- D. Hydrostatic pressure is greater than osmotic pressure

Answer: - Option D

Explanation: - The main principle of reverse osmosis is hydrostatic pressure must be greater than osmotic pressure.

Q.17. What is the function of coagulant?

- A. It helps in increasing the solubility
- B. It helps in formation of fine precipitate
- C. It helps in increasing the boiling point
- D. It helps in formation of coarse precipitate

Answer: - Option D

Explanation: - Coagulants are used to remove a wide variety of hazardous materials from water, ranging from organic matter and pathogens, to inorganics and toxic materials. Thus coagulant helps in formation of coarse precipitate.

Q.18. $\text{Ca}(\text{HCO}_3)_2$ in water on vigorous boiling forms

- A. CO_2 and H_2O
- B. CaO and CO_2
- C. CaCO_3 , CO_2 and water
- D. CaCO_3 and CO_2

Answer: - Option C

Explanation: - $\text{Ca}(\text{HCO}_3)_2$ in water on vigorous boiling forms CaCO_3 , CO_2 and water

Q.19. The ultimate source of water is

- A. Underground and surface
- B. Rain and snow
- C. Rivers and lakes
- D. Dew and forest

Answer: - Option C

Explanation: - The ultimate source of water is rain and snow.

Q.20. Water containing $\text{Ca}(\text{HCO}_3)_2$ and MgCl_2

- A. Temporary and Permanent hard B. Soft water
C. Permanent hard only D. Temporary hard only

Answer: - Option A

Explanation: - $\text{Ca}(\text{HCO}_3)_2$ salt forms temporary hardness in water and MgCl_2 forms permanent hardness in water.

Q.21. The purest form of naturally occurring water is

- A. Pond water B. River water
C. Well water D. Rain water

Answer: - Option D

Explanation: - The purest form of naturally occurring water is rain water.

Q.22. Addition of small doses of chlorine gas into filtered water is known as

- A. Sedimentation B. Chlorination
C. Filtration D. Coagulation

Answer: - Option B

Explanation: - Addition of small doses of chlorine gas into filtered water is known as chlorination.

Q.23. BOD stands for

- A. Biological oxygen depletion B. Biochemical oxygen demand
C. British oxygen demand D. British oxygen depletion

Answer: - Option B

Explanation: - BOD stands for biochemical oxygen demand.

Q.24. When temporary hard water is boiled, one of the substances formed is

- A. Calcium bicarbonate B. Calcium sulfate
C. Hydrogen chloride D. Carbon dioxide

Answer: - Option D

Explanation: - Temporary hard water contains $\text{Ca}(\text{HCO}_3)_2$ after boiling temporary hard water $\text{Ca}(\text{HCO}_3)_2$ salt converts into CaCO_3 , CO_2 and water.

Q.25. The phenomenon during which the boiler material becomes brittle due to accumulation of caustic substances is known as

- A. Priming B. Corrosion
C. Caustic embrittlement D. Foaming

Answer: - Option C

Explanation: - The phenomenon during which the boiler material becomes brittle due to accumulation of caustic substances is known as Caustic embrittlement.

Q.26. Foaming is caused by the formation of

- A. Oils and alkalis B. Alcohols
C. Acids D. Ketones

Answer: - Option A

Explanation: - Foaming is the production of persistent foam or bubbles in boilers, which do not break easily. Foaming is due to presence of substances like oils (which greatly reduce the surface tension of water).

Q.27. Which of the following ion get released from the cation exchange column?

- A. H^+
- B. K^+
- C. Ca^{+2}
- D. Na^+

Answer: - Option A

Explanation: - Ion gets released from the cation exchange column are H^+ , SO_4^{-} , Cl^- etc

Q.28. Which of the following ion get released from the anion exchange column?

- A. SO_4^{-2}
- B. CO_3^{-2}
- C. OH^-
- D. Cl^-

Answer: - Option C

Explanation: - Ion gets released from the anion exchange column are OH^- .

Q.29. Ion-free water coming out from the exchanger is known as

- A. Disinfected water
- B. Demineralized water
- C. Coagulated water
- D. Potable water

Answer: - Option B

Explanation: - Ion-free water coming out from the exchanger is known as demineralized water.

Q.30. Sedimentation is a physical process used to remove

- A. Suspended particles
- B. Colloidal particles
- C. Microorganisms
- D. All of these

Answer: - Option A

Explanation: - Sedimentation is a physical process used to remove suspended particles.

Q.31. The exhausted cation exchange column is regenerated by passing a solution of

- A. Dil. HCl
- B. Conc. NaOH
- C. Dil. NaCl
- D. Dil. NaOH

Answer: - Option A

Explanation: - The exhausted cation exchange column is regenerated by passing a solution of Dil. HCl.

Q.32. Semi-permeable membrane is selective membrane which does not permit the passage of dissolved _____ particles.

- A. Anhydrous
- B. Saturated
- C. Solvent
- D. Solute

Answer: - Option D

Explanation: - Semi-permeable membrane is selective membrane which does not permit the passage of dissolved solute particles.

Q.33. What are the disadvantages of using high alkaline water?

- A. It may lead to electrolysis
- B. It may lead to indigestion
- C. It may lead to infections
- D. It may lead to caustic embrittlement

Answer: - Option D

Explanation: - If we use high alkaline water in boiler then it may lead to caustic embrittlement.

Q.34. The external treatment of water does not include

- A. Ion-exchange process
- B. Lime-soda process
- C. Zeolites
- D. Sequestration

Answer: - Option D

Explanation: - Ion-exchange process, Lime-soda process, Zeolites process are external treatment methods. While Colloidal Conditioning, Carbonate Conditioning, Phosphate Conditioning, Calgon Conditioning, Sequestration are internal treatment methods.

Q.35. Equivalent weight of CaCO_3

- A. 100
- B. 50
- C. 125
- D. 75

Answer: - Option B

Explanation: - Equivalent weight of CaCO_3 is 50.

Q.36. What is calgon?

- A. Calcium hexa meta sulphate
- B. Potassium hexa meta sulphate
- C. Sodium hexa meta phosphate
- D. Magnesium hexa meta phosphate

Answer: - Option B

Explanation: - Calgon is sodium hexa meta phosphate. $\text{Na}_2[\text{Na}_4(\text{PO}_3)_6]$ or $(\text{NaPO}_3)_6$ which reacts with calcium ions forming a highly soluble calcium hexametaphosphate complex and thus prevents the formation of scale.

Q.37. Potable water treatment does not involve

- A. Demineralization
- B. Coagulation
- C. Sedimentation
- D. Disinfection

Answer: - Option A

Explanation: - Potable water treatment involves coagulation, sedimentation and disinfection methods.

Q.38. Fluoride is also added to water, which helps to prevent

- A. Fever
- B. Tooth decay
- C. Sickness
- D. Infections

Answer: - Option B

Explanation: - Fluoride is also added to water, which helps to prevent tooth decay. Fluoride helps strengthen the mineral structure of developing teeth.

Q.39. The exhausted anion exchangers can be regenerated by working with

- A. Water
- B. Alkali solution
- C. Alcohol solution
- D. Acid solution

Answer: - Option B

Explanation: - The exhausted anion exchangers can be regenerated by working with alkali solution (NaOH).

Q.47. Which of the following is not used in colloidal conditioning?

- A. Agar-agar
- B. Kerosene
- C. Vinegar
- D. Tannin

Answer: - Option C

Explanation: - Scale formation can be avoided by the addition of colloidal conditioning agents like kerosene, glue, agar – agar ,tannin and gelatin.

Q.48. In zeolite process, the exchange of _____ takes place.

- A. Anions
- B. No ions exchange
- C. Cations
- D. Both cations and anions

Answer: - Option C

Explanation: - In zeolite process , the exchange of cations takes place.

Q.49. Soaps are _____ based soapy detergents.

- A. Acid
- B. Water
- C. Kerosene
- D. Oil

Answer: - Option D

Explanation: - Soaps are oil based soapy detergents. Soaps for cleansing are obtained by treating vegetable or animal oils and fats with a strongly alkaline solution.

Q.50. The saponification of a fat or oil is done using _____ solution for hot process

- A. NaCl
- B. NaOH
- C. HCl
- D. KOH

Answer: - Option B

Explanation: - Soaps are oil based soapy detergents. Soaps for cleansing are obtained by treating vegetable or animal oils and fats with a strongly alkaline solution like NaOH. NaOH gives hard soaps.

Q.51. The saponification of a fat or oil is done using _____ solution for cold process.

- A. NaCl
- B. NaOH
- C. HCl
- D. KOH

Answer: - Option B

Explanation: - The saponification of a fat or oil is done using KOH solution for cold process. When potassium hydroxide (KOH) is used, a soft soap is formed. It cannot be used in hard water.

Q.52. Which of the following is a typical soap molecule?

- A. Sodium stearate
- B. Calcium stearate
- C. Potassium permanganate
- D. Sodium bicarbonate

Answer: - Option A

Explanation: - Sodium stearate (a white solid) is the most common type of soap. Sodium stearate ($C_{17}H_{33}COONa$) is formed as the soap.

Q.53. Reverse osmosis is a water purification technique that uses

- A. Lime soda
- B. Resins
- C. Coagulant
- D. Semipermeable membrane

Answer: - Option D

Explanation: - Reverse osmosis involves the application of pressure (usually greater than the osmotic pressure) on one side of the solution where a semipermeable membrane is placed in between the solutions.

Q.54. The stearate ion has a _____ carbons long hydrocarbon chain.

- A. 19
- B. 23
- C. 17
- D. 21

Answer: - Option C

Explanation: - Sodium stearate (a white solid) is the most common type of soap. Sodium stearate ($C_{17}H_{33}COONa$) is formed as the soap. The stearate ion has a 17 carbons long hydrocarbon chain.

Q.55. Colloidal impurities in water are removed by,

- A. Sterilization
- B. Coagulation & Sedimentation
- C. Distillation of water
- D. Sedimentation

Answer: - Option B

Explanation: - Colloidal impurities in water are removed by, Coagulation and sedimentation. Very fine suspended and colloidal impurities are removed from water by a process called Coagulation & Sedimentation.

Q.56 _____ is the amount of oxygen required to oxidize only organic matter in sewage.

- A. BOD
- B. COD
- C. DO
- D. Turbidity

Answer: - Option A

Explanation: - BOD is defined as the amount of oxygen demanded by microorganisms to decompose biodegradable organic matter present in wastewater under anaerobic conditions.

Q.57. When soap is added to hard water, a white precipitate of -----is formed.

- A. Flux
- B. Scale
- C. Scum
- D. Sludge

Answer: - Option C

Explanation: - When soap is added to hard water, a white precipitate of scum is formed.

Q.58. Screening is the process of removing from water

- A. Suspended particles
- B. Floating materials
- C. Hardness
- D. Scale and sludge

Answer: - Option B

Explanation: - Screening method is used to remove floating material from water.

Q.59. The process of reverse osmosis is also known as

- A. Hyper-osmosis
- B. Double-osmosis
- C. Hyper-filtration
- D. Double-filtration

Answer: - Option C

Explanation: - The process of reverse osmosis is also known as hyper filtration.

Q.60. Coagulant like alum is added to water to remove

- A. Colloidal impurities
- B. Floating materials
- C. Biological impurities
- D. All of these

Answer: - Option A

Explanation: - Colloidal impurities can be removed from water by adding coagulant like alum.

Q.61. The chemical composition of Alum is

- A . $\text{Al}_3 (\text{SO}_4)_2 \cdot 18\text{H}_2\text{O}$ B. $\text{Al}_2 (\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$
C . $\text{Al}_2 (\text{SO}_4)_2 \cdot 18\text{H}_2\text{O}$ D. $\text{Al}_4 (\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$

Answer: - Option B

Explanation: - The chemical composition of Alum is $\text{Al}_2 (\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$

Q.62. Sterilization of water can be done by

- A . Using UV rays B. Chlorination
C . Aeration D. All of these

Answer: - Option B

Explanation: - The chemical composition of Alum is $\text{Al}_2 (\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$

Q.63. Which gas is released when alum is added to water?

- A . $\text{Al}(\text{OH})_3$ B. CO_2
C . $\text{Ca}(\text{OH})_3$ D. CaSO_4

Answer: - Option B

Explanation: - Carbon dioxide gas is released when alum is added to water, which is corrosive to metals.

Q.64. The maximum desirable limit (BIS) of total hardness (as CaCO_3) in drinking water is

- A . 600 ppm B. 300 ppm
C . 500 ppm D. 1000 ppm

Answer: - Option B

Explanation: - The desirable limit for hardness in drinking water is 300 mg/l as CaCO_3 .

Q.65. Hardness of water is accurately determined by titration against

- A . Standard AgNO_3 B. Standard EDTA
C . Standard H_2SO_4 D. Standard KMnO_4

Answer: - Option B

Explanation: - Hardness of water is accurately determined by titration against standard EDTA.

Q.66. Colour of Calcium-EBT complex is

- A . Wine red B. Blue
C . Green D. Yellow

Answer: - Option B

Explanation: - In its deprotonated form, Eriochrome Black T i.e.(EBT) is blue. It turns wine red when it forms a complex with calcium, magnesium, or other metal ions. EBT is blue in a buffered solution at pH 10

Q.67. Colour of calcium -EDTA complex is

- A . Green B. Colorless
C . Blue D. Yellow

Answer: - Option B

Explanation: - Colour of calcium -EDTA complex is colourless.

Q.68 Colour of indicator Erichrome black T is

- A . Green B. Colorless
C . Blue D. Yellow

Answer: - Option B

Explanation: - Ion-exchange process is used to obtain distilled water or deionized water.

Q.83. The sterilization of Swimming pool water can be done by using _____

- A. KMnO_4
- B. UV rays
- C. Bleaching powder
- D. Cl_2 gas

Answer: - Option B

Explanation: - The sterilization of Swimming pool water can be done by using UV rays. Ultraviolet light of wavelength 253.7 nanometers is used for disinfection of bacteria, viruses, molds, algae, and other microorganisms.

Q.84. According to BIS, the maximum permissible limit of dissolved solids in drinking water is _____

- A. 1000 mg/lit
- B. 2000 mg/lit
- C. 200 mg/lit
- D. 500 mg/lit

Answer: - Option B

Explanation: - According to BIS, the maximum permissible limit of dissolved solids in drinking water is 2000 mg/lit.

Q.85. In the ion exchange process, exhausted cation ex-changer are regenerated by using _____

- A. Salts
- B. Acids
- C. Brine solution
- D. bases

Answer: - Option B

Explanation: - In the ion exchange process, exhausted cation ex-changer are regenerated by using acids $\text{Conc. H}_2\text{SO}_4$.

Q.86. The process of removing hardness causing salts from water is called as _____ of water.

- A. Filtering
- B. Soaping
- C. Settling
- D. Softening

Answer: - Option B

Explanation: The process of removing hardness causing salts from water is called as softening of water.

Q.87. Hardness of water is expressed in terms of equivalent of _____

- A. MgCl_2
- B. CaCO_3
- C. MgCO_3
- D. CaCl_2

Answer: - Option B

Explanation: Hardness of water is expressed in terms of equivalent of CaCO_3 .



05 – Electrochemistry and Batteries

Marks:- 10

- 5.1. Introduction
- 5.2. Galvanic cell
- 5.3. Electrode potential i) Single electrode potential ii) Standard electrode potential
- 5.4. Factor affecting electrode potential i) Nature of electrode ii) Concentration of ionic solution iii) Temperature
- 5.5. Electrochemical series i) Application of electrochemical series
- 5.6. Electromotive force (EMF)
- 5.7. Nernst equation
- 5.8. Battery i) Primary batteries ii) Secondary batteries 9. Lead storage battery

Q 1. Specific resistance or resistivity of a substance is measured in__

- A. ohms
- B. mhos
- C. ohm-cm
- D. cm/ohm

Answer: - Option C

Explanation: - Resistance offered per unit length and unit cross-sectional area

Q 2. The correct statement of Ohm's law is

- A. $V=R/I$
- B. $R=IV$
- C. $I=R/V$
- D. $V=IR$

Answer: - Option D

Explanation: - current through a conductor between two points is directly proportional to the voltage across the two points.

Q 3. Conductivity is defined as the ability to carry

- A. voltage
- B. resistance
- C. current
- D. all of above

Answer: - Option C

Explanation: - Conductivity is defined as the ability to carry current.

Q 4. The reciprocal of conductance is

- A. Viscosity
- B. Resistance
- C. Turbidity
- D. Electricity

Answer: - Option B

Explanation: - Conductance is opposite to resistance

Q 5. The factor which affects the conductance of electrolyte solution is

- A. temperature
- B. nature of solvent
- C. nature of solute
- D. all of above

Answer: - Option D

Explanation: - Temperature, nature of solvent and nature of solute affects the conductance of electrolyte solution.

Q 6. The weak electrolyte are

- A. weakly ionized in solution B. highly ionized in solution
C. stable in solution D. all of the above

Answer: - Option A

Explanation: - Weakly ionized in solution contains less number of ions

Q 7. Dilution means increase in the amount of

- A. solute B. solvent
C. electrolyte D. viscosity

Answer: - Option B

Explanation: - Dilution means increase in the amount of solvent and decrease in the amount of solute.

Q 8. A battery consists of

- A. Cell B. Circuit
C. Generator D. Number of cells

Answer: - Option D

Explanation: - Battery consists of more than one cell.

Q 9. The example of primary cell is

- A. Dry cell B. Lead acid cell
C. Nickel-cadmium cell D. Fuel cell

Answer: - Option A

Explanation: - A primary cell is a battery (a galvanic cell) that is designed to be used once and discarded, and not recharged

Q 10. The example of secondary cell is

- A. dry cell B. Daniel cell
C. leclanche cell D. lead acid cell

Answer: - Option D

Explanation: - A rechargeable battery, storage battery, or secondary cell, (or archaically accumulator)

Q 11. The example of alkaline battery is

- A. Lead-acid cell B. Lithium ion cell
C. Dry cell D. Daniel cell

Answer: - Option B

Explanation: - Lithium batteries are primary batteries that have metallic lithium as an anode.

Q 12. Alkaline battery contains electrolyte

- A. Potassium hydroxide B. Sulphuric acid
C. Hydrochloric acid D. Sodium hydroxide

Q 20. The formula of lead sulphate is

- A. $\text{Pb}_2(\text{SO}_4)_2$ B. PbSO_4
C. PbO_2 D. $\text{Pb}(\text{NO}_3)_2$

Answer: - Option

Explanation: - Pd has electrovalencey +2

Q 21. During discharging in lead-acid storage battery

- A. concentration of sulphuric acid storage battery
B. concentration of sulphuric acid decreases
C. concentration of sulphuric acid not affected
D. none of the above

Answer: - Option B

Explanation: - During discharging H_2SO_4 Converted in to PbSO_4

Q 22. During charging in lead-acid storage battery

- A. concentration of sulphuric acid increases
B. concentration of sulphuric acid decreases
C. no effect on acid concentration
D. concentration of acid remains unaffected

Answer: - Option A

Explanation: - During charging PbSO_4 Converted in to H_2SO_4

Q 23. Active material of a lead acid storage battery is _____

- A. Pb B. Cd
C. C D. Cu

Answer: - Option A

Explanation: - During charging PbSO_4 Converted in to H_2SO_4

Q 24. Which cell has reversible chemical reaction

- A. Lead acid B. Dry cell
C. Daniel cell D. Mercury Oxide

Answer: - Option A

Explanation: - Reversible chemical reaction occurs while charging

Q 25. The life of lead acid storage battery is expected to be

- A 6 month. B. 1 year
C. 1 year D. 10 to 15 years

Answer: - Option A

Explanation: - Sealed lead acid batteries can have a design life of anywhere 6 month.

Q 26. In Lead acid cell hydrogen is liberated at

- A. Negative plates B. positive plates
C. both the plates D. none of the plates

Answer: - Option A

Explanation: - During the charging process, the battery cell cannot absorb all of the energy from the charging current supply. Through electrolysis principle, excess energy breaks down the water and it creates the hydrogen and oxygen gasses. The oxygen is liberated at the positive plates and the hydrogen at the negative

Q 27. The cell constant is

- A. specific conductivity X resistivity
- B. specific conductivity X conductivity
- C. the ratio of specific conductivity and resistance
- D. the ratio of conductance and resistance

Answer: - Option A

Explanation: - constant is defined as the ratio of distance between the electrodes which is divided by the area of the cross-sectional of the electrode

Q 28. In the Lead acid PbSO₄ formed in

- A. charging only
- B. discharging only
- C. both charging and discharging
- D. none of the above

Answer: - Option B

Explanation: - During charging PbSO₄ Converted in to H₂SO₄

Q 29. The Positive plates of nickel-cadmium cell is _____

- A. Nickel hydroxide
- B. Lead peroxide
- C. Cadmium oxide
- D. Nickel and cadmium

Answer: - Option B

Explanation: - The positive plates are made from a porous plaque on which nickel-hydroxide has been deposited.

Q 30. The emf of dry cell is

- A. 0.5 Volt
- B. 1.5 Volt
- C. 1 Volt
- D. 2.5 Volt

Answer: - Option B

Explanation: - Standard dry cell comprises is zinc anode that is basically in the form of a cylindrical pot that has a carbon cathode that is in the form of a central rod with standard quantity of .

Q 31. In lead acid battery the ratio of sulphuric acid and water is

- A. 3:1
- B. 1:3
- C. 1:1
- D. None of the above

Answer: - Option B

Explanation: - 75 percent water to 25 percent Sulfuric acid.

Q 32. In dry cell what is the consistency of the electrolyte

- A. Solid
- B. Liquid
- C. Paste
- D. Powder

Answer: - Option C

Explanation: - In dry cell paste is easy for handling dry cell

Q 33. The Complex ion found in dry cell is

- A. $[\text{Cu}(\text{NH}_3)_4]^{+2}$
- B. ZnSO_4
- C. $[\text{Zn}(\text{NH}_3)_4]^{+2}$
- D. CuSO_4

Answer: - Option C

Explanation: - The Complex ion found in dry cell is $[\text{Zn}(\text{NH}_3)_4]^{+2}$

Q 34. The Dry cell get corroded even when not in use because

- A. NH_4Cl is acidic in nature corrodes Zn container
- B. NH_4Cl is alkaline in nature corrodes Zn container
- C. NH_4Cl is neutral so corrodes on Zn container
- D. None of the above

Answer: - Option A

Explanation: - Acid has tendency to gain electron from metals and hence metals get corroded

Q 35. The anodic cell reaction in dry cell is

- A. $\text{Zn}^{+2} + 2\text{e}^- \rightarrow \text{Zn}$
- B. $\text{NH}_4^+ + \text{Cl}^- \rightarrow \text{NH}_4\text{Cl}$
- C. $\text{Zn} \rightarrow \text{Zn}^{+2} + 2\text{e}^-$
- D. $\text{ZnCl}_2 \rightarrow \text{Zn}^{+2} + 2\text{Cl}^-$

Answer: - Option A

Explanation: - At anode reduction takes place

Q 36. In dry cell , electrolyte is

- A. a paste of NH_4Cl and ZnCl_2
- B. a paste of NaCl and ZnCl_2
- C. a paste of NH_4Cl and NaCl
- D. all the above

Answer: - Option A

Explanation: - At Zn anode reduction takes place

Q 37. Dry cell are widely used in

- A. Inverters
- B. Lead cell batteries
- C. Transformers
- D. Transistors

Answer: - Option D

Explanation: - Dry cell are widely used in Transistors.

Q 38. In dry cell Carbon rod is surrounded by a paste of

- A. Mn_2O_3 and Carbon
- B. MnO_2 and carbon
- C. Graphite and Mn_2O_3
- D. Carbon and graphite

Answer: - Option B

Explanation: - Carbon rod is worked as electron carrier

Q 39. In dry cell the cell reaction are

- A. reversible
- B. Non reversible
- C. convertible
- D. all of the above

Answer: - Option B

Explanation: - At the end of reaction a very stable product is formed

Q 40. The emf of nickel cadmium battery is

- A. 1.2-1.4 Volt
- B. 2.1 Volt
- C. 0.2 Volt
- D 2.5 Volt

Answer: - Option A

Explanation: - The emf of nickel cadmium battery is 1.2-1.4 Volt

Q 41. In lithium ion battery non aqueous electrolyte is generally used because

- A. Lithium reacts rigorously with water to form lithium hydroxide and hydrogen ion.
- B. Lithium reacts with battery container and corrodes it.

Q 49. The life of lead acid storage battery is expected to be

- A. 6 month.
- B. 1 year
- C. 1 year
- D. 10 to 15 years

Answer: - Option A

Explanation: - Sealed lead acid batteries can have a design life of anywhere 6 month.

Q 50. The Positive plates of nickel-cadmium cell is _____

- A. Nickel hydroxide
- B. Lead peroxide
- C. Cadmium oxide
- D. Nickel and cadmium

Answer: - Option B

Explanation: - The positive plates are made from a porous plaque on which nickel-hydroxide has been deposited.

Q 51. The byproduct of fuel cell is

- A. Hydrogen gas
- B. Water
- C. Oxygen gas
- D. Potassium hydroxide

Answer: - Option B

Explanation: - Fuel cells that use pure hydrogen fuel are completely carbon-free, with their only byproducts being electricity, heat, and water.

Q 52. In electrolytic conductors the conductivity is due to

- A. Movement of electrons
- B. Movement of ions
- C. Decrease in temperature
- D. All the above

Answer: - Option B

Explanation: - In the case of metals, the conduction is due to the flow of charge that is electrons. In the electrolytic solution, the charged particles present are the ions and hence an electrolytic solution is capable of conducting electric current.

Q 53. The conductivity of electrolyte increases with

- A. Decrease in temperature
- B. Constant temperature
- C. Increases and decreases in temperature
- D. Increase in temperature

Answer: - Option D

Explanation: - With increase in temperature, the conductivity of an electrolyte increases. Electricity is carried out through the solution of an electrolyte by migration of ions.

Q 54. The resistance of a conductor is

- A. Directly proportional to length
- B. Inversely proportional to length
- C. Directly proportional to area of cross section
- D. None of the above

Answer: - Option A

Explanation: - Electrical resistance is the opposition to the flow of current in the conductor. It is the reciprocal of electrical conductance. We know that the resistance of the conductor depends on the material used, size and shape of the material, temperature of the material.

Q.55. The resistance of a conductor is

- A. Inversely proportional to length
- B. Inversely proportional to area of cross section
- C. Directly proportional to area of cross section
- D. None of the above

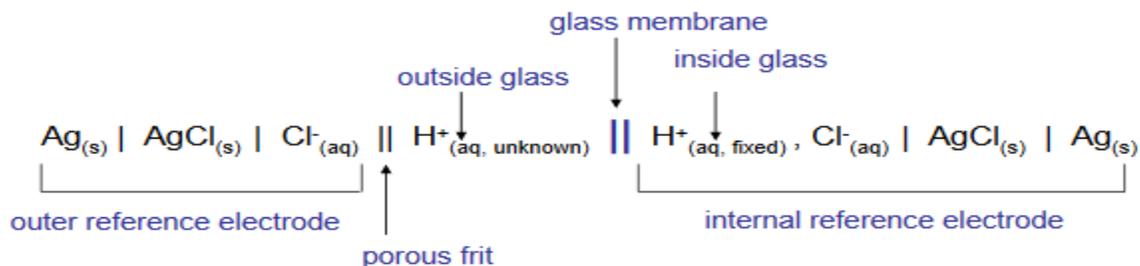
Answer: - Option B

A. Ag,AgCl,0.1 HCl |glass membrane
 C. Ag,0.1M HCl ,AgCl

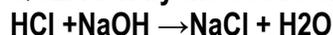
B. Ag,|Agcl |glass membrane
 D. Glass membrane ,Ag,0.1M HCl | AgCl

Answer: - Option A

Explanation: - It deserves some explanation. This device is essentially a galvanic cell that can be schematically represented as: Glass electrode || Reference Solution || Test Solution || Glass electrode. $\text{Ag(s)} | \text{AgCl(s)} | \text{KCl(aq)} || 1 \times 10^{-7} \text{M H}^+ \text{ solution} || \text{glass membrane} || \text{Test Solution} || \text{junction} || \text{KCl(aq)} | \text{AgCl(s)} | \text{Ag(s)}$



Q 62. Identify the conductometric titration for the reaction



- A. Strong acid-strong base
- C. Weak acid-weak base

- B. Strong acid –weak base
- D. Weak acid-strong base

Answer: - Option A

Explanation: - HCl is strong acid and NaOH is strong base, so this is Strong acid-strong base conductometric titration.

Q 63. Identify the type of titration $\text{KCl} + \text{AgNO}_3 \rightarrow \text{AgCl} \downarrow + \text{KNO}_3$

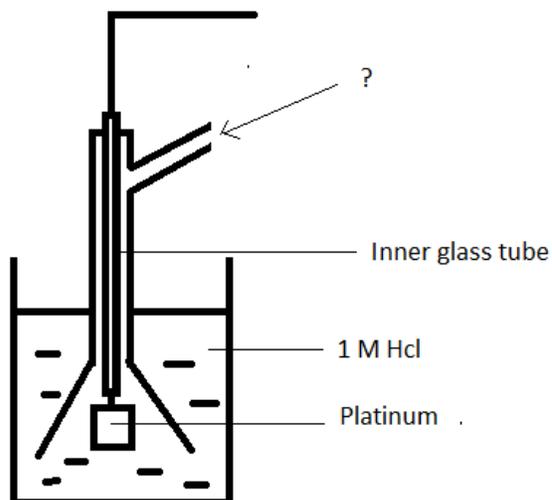
- A. Redox titration
- C. Precipitation titration

- B. Reduction – oxidation titration
- D. None of above

Answer: - Option C

Explanation: - $\text{KCl} + \text{AgNO}_3 = \text{AgCl} + \text{KNO}_3$ Silver chloride is a white precipitate.

Q 64. Given below is a diagram of hydrogen electrode. Identify the unmarked component.



A. Hydrogen at 1 atm

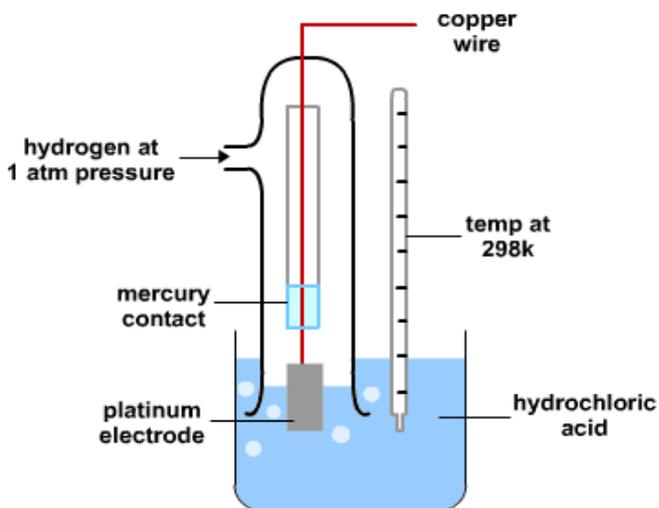
B. Helium at 1 atm

C. Hydrogen at 10 atm

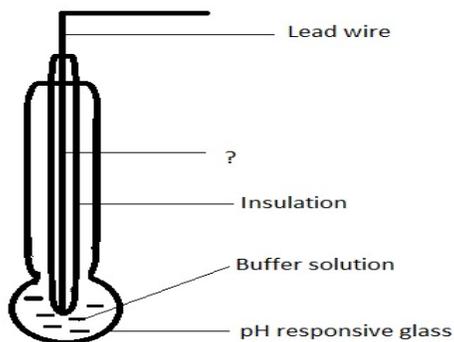
D. Helium at 10 atm

Answer: - Option A

Explanation: -



Q 65. Given below is the diagram of glass electrode. Identify the unmarked component.



A. Platinum leads

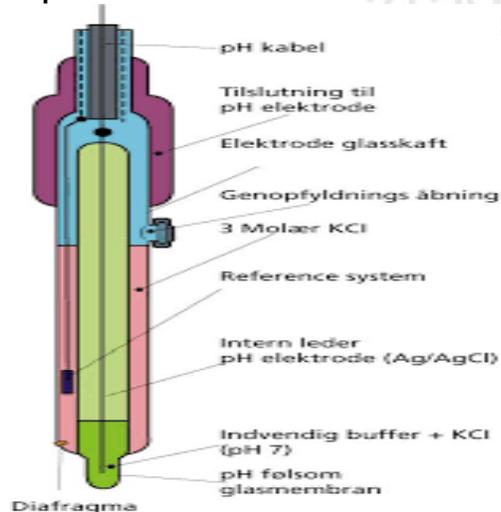
B. Copper wire

C. Silver wire coated with silver chloride

D. Platinum reference electrode

Answer: - Option C

Explanation: -





06 – METAL ALLOYS AND INSULATOR

Marks:-12

Content of Chapter:-

- 6.1 Identify the properties of metals and alloys related to engineering applications, Describe the process of extraction of metals.
- 6.2 Occurrence of metals in free and combined state, definitions - mineral, ore, gangue, flux and slag, metallurgy.
- 6.3 Metallurgy - Detailed flow chart for extraction of metal.
- 6.4 Important extraction processes: Concentration - gravity separation, electromagnetic separation, froth floatation, calcination and roasting, Reduction - smelting, aluminothermic process, Refining - poling, electrorefining.
- 6.5 Mechanical properties of metals - Hardness, ductility, malleability, tensile strength, toughness, machinability, weldability, forging, soldering, brazing, castability.
- 6.6 Definition, purposes of making alloys with examples.
- 6.7 Preparation methods - Fusion, compression.
- 6.8 Classification of alloys - Ferrous and non-ferrous alloys with examples.
- 6.9 Examples of alloys - Composition, properties and applications of duralumin, Woods metal, babbitt metal.

Q 1. Which of the following metals are used in making the filament of an electric bulb?

- | | |
|-------------|-------------|
| A. Platinum | B. Tungsten |
| C. Carbon | D. Chromium |

Answer: - Option B

Explanation: - Melting Point of Tungsten is high

Q 2. Which of the following metal used in statue of Liberty?

- | | |
|-----------|-----------|
| A. Gold | B. Iron |
| C. Bronze | D. Copper |

Answer: - Option D

Explanation: - Copper is easily malleable

Q 3. Metals are good conductor of electricity because _____

- | | |
|-----------------------------------|--|
| A. They are electrically unstable | B. Atoms in their molecules are loosely packed |
| C. They have free electron | D. They are ductile |

Answer: - Option C

Explanation: - Electrons are required for the electrical conductivity

Q 4. In which metal speed of sound is the fastest?

- A. Copper
- B. Aluminium
- C. Steel
- D. Gold

Answer: - Option B

Explanation: - Interatomic Distance is less in Aluminium

Q 5. Bauxite is an ore of which of the following metals?

- A. Iron
- B. Copper
- C. Aluminium
- D. Gold

Answer: - Option C

Explanation: - Bauxite is a sedimentary rock with a relatively high Aluminium content

Q 6. The toxicity of which heavy metal leads to liver cirrhosis

- A. Copper
- B. Lead
- C. Mercury
- D. Zinc

Answer: - Option A

Explanation: - Wilson's disease is a genetic disorder in which excess copper builds up in the body

Q 7. Which of the following causes condensation

- A. An increase in temperature
- B. An decrease in temperature
- C. An increase in salinity
- D. An decrease in salinity

Answer: - Option B

Explanation: - Vapors starts to convert in to liquids after cooling

Q 8. What is the condensation point of water?

- A. 0 °C
- B. 0 degree Fahrenheit
- C. 100 degree Fahrenheit
- D. 212 degree Fahrenheit

Answer: - Option D

Explanation: - 212 degree Fahrenheit = 100 °C

Q 9. Which of the following causes water beads on the outside of the glass of water?

- A. Water inside the glass transferring to the outside
- B. Water vapour in the atmosphere condensing on to the glass
- C. Cold water boiling onto the outside of the glass
- D. Water from inside the glass freezing onto the glass

Answer: - Option B

Explanation: - The moisture in the air around the outer surface of the glass condensates

Q 10. Graphene is a

- A. Wide band-gap semiconductor
- B. Gapless band semiconductor

C. Not a semiconductor but behaves like graphite

D. A narrow bandgap semiconductor

Answer: - Option B

Explanation: - Graphene is a linear dispersion material

Q 11. To be classed as “nanoscale”, an object must have one dimension that is of the order of

A. 10-10m

B. 10-12m

C. 10⁻⁹m

D. 10-15m

Answer: - Option C

Explanation: - 10⁻⁹m = 1nm

Q 12. A grapheme sheet differs from the framework of a fullerenes because _____

A. The graphene sheet consists of C_n rings in which n=5 and 6, but in a fullerenes n=5

B. The graphene sheet consists of C_n rings in which n=6, but in some fullerenes n=5

C. The graphene sheet consists of C_n rings in which n=6, but in fullerenes n=5 and 6

D. The graphene sheet consists of C_n rings in which n=5 or 6, but in most fullerenes n=6

Answer: - Option C

Explanation: - 5 and 6 Membered rings are observed in fullerenes

Q 13. Graphene is

A. Three dimensional material

B. One of the strongest isotopes of carbon

C. Used in nanotechnology

D. None of these

Answer: - Option C

Explanation: - Thickness of grapheme sheet (Two dimensional) is in nm

Q 14. Which of the application of nanotechnology to food science and technology

A. Agriculture

B. Food safety and biosecurity

C. Product development

D. All of the above

Answer: - Option D

Explanation: - nanotechnology has broad application area

Q 15. 1 nanometer = _____ cm

A. 10⁻⁹

B. 10⁻⁸

C. 10⁻⁷

D. 10⁻⁶

Answer: - Option C

Explanation: - 10⁻⁹ m = 1nm & 100 cm = 1m

Q 16. The most important property of nanomaterial is

- A. force
- B. friction
- C. pressure
- D. temperature

Answer: - Option B

Explanation: - The surface area to volume ratio of nanoparticles is extremely high hence nanomaterial shows less friction

Q 17. The diameter of a bucky ball is about _____

- A. 1A0
- B. 100A0
- C. 1nm
- D. 10nm

Answer: - Option C

Explanation: - The smallest buckyballs are made up of 60 carbon atoms and have diameter of about 1 nanometer.

Q 18. A bucky ball is a molecule consisting of _____ carbon atoms

- A. 50
- B. 60
- C. 75
- D. 100

Answer: - Option B

Explanation: - The smallest buckyballs are made up of 60 carbon atoms and have diameter of about 1 nanometer.

Q 19. 1 meter = _____ nm

- A. 10^9
- B. 10^{-9}
- C. 10^{10}
- D. 10^{-10}

Answer: - Option A

Explanation: - $10^{-9} \text{ m} = 1 \text{ nm}$

Q 20. _____ are the extensions of bucky balls.

- A. Geodesic domes
- B. Hexagons
- C. Carbon nanotubes
- D. AFM and STM

Answer: - Option C

Explanation: - Carbon nanotubes consist of carbon rings similar to Bucky balls.

Q 21. Nanotechnology in other words is _____

- A. Carbon engineering
- B. Atomic engineering
- C. Small technology
- D. microphysics

Answer: - Option B

Explanation: - Because it involved the atomic size measurements

Q 22. In Bucky ball each carbon atom is bound to _____ adjacent carbon atom

- A. 1
- B. 2
- C. 3
- D. 4

Answer: - Option C

Explanation: - In Bucky ball C atom is in SP² hybridized state.

Q 23. Highly vulcanisation rubber is called as ___

- A. Ebolite
- B. Hematite
- C. Bakelite
- D. Magnetite

Answer: - Option A

Explanation: - Ebonite is a brand name for a material generically known as hard rubber, and is obtained by vulcanizing natural rubber

Q 24. The polymer used in inner tubes of tyres is

- A. Neoprene rubber
- B. styrene butadiene
- C. butyl rubber
- D. natural rubber

Answer: - Option C

Explanation: - It can be made from the monomer isobutylene

Q 25. Which one of the following is an elastomer?

- A. PVC
- B. Natural rubber
- C. Bakelite
- D. Nylon

Answer: - Option B

Explanation: - The term "elastomer" is derived from "elastic polymer," frequently interchanged with the term "rubber."

Q 26. Raw rubber in vulcanisation becomes

- A. Plastic
- B. Soft
- C. tacky
- D. less elastic

Answer: - Option A

Explanation: - Vulcanization (British: Vulcanisation) is a range of processes for hardening rubbers.

Q 27. Select the polymer which is used for the manufacture of rubber tyres

- A. Styrene rubber
- B. Neoprene rubber
- C. Nitrile rubber
- D. Butyl rubber

Answer: - Option A

Explanation: - Rubber polymers used in tire manufacturing are butadiene rubber and styrene butadiene rubber

Q 28. Which metal /alloy is used in electric heating elements?

- A. Nichrome
- B. Chromium
- C. Steel
- D. Bronze

Answer: - Option A

Explanation: - High melting point of Nichrome (about 1400 °C)

Q 29. Why are noble metals so named?

- A. Because they are expensive
- B. Because they are resistant to corrosion and oxidation
- C. Because they are rarely found in the earth

D. Because they are more malleable and ductile than others

Answer: - Option B

Explanation: - Because they are chemically inert

Q 30. Nichrome is used as heating element because of its

A. Low resistivity and high M.P

B. High resistivity and Low M.P

C. Low resistivity and Low M.P.

D. High resistivity and high M.P

Answer: - Option D

Explanation: - High melting point of Nichrome (about 1400 °C)

Q 31. Asbestos is made up of_____

A. copper, zinc and manganese

B. calcium and magnesium

C. lead and iron

D. calcium and Zinc

Answer: - Option B

Explanation: - Asbestos is a naturally occurring fibrous silicate mineral.

Q 32. What is Asbestos ?

A. A man made synthetic material

B. A natural material derived from sand particles

C. A natural material derived from certain rock formation

D. None of the above

Answer: - Option C

Explanation: - Asbestos is a naturally occurring fibrous silicate mineral.

Q 33. Any exposure to the fibres of asbestos is dangerous because

A. The effects of asbestos are immediate

B. The full aspects of the material is not yet fully known

C. It disrupts the lungs functioning capabilities

D. None of the above

Answer: - Option C

Explanation: - The most common way for asbestos fibers to enter the body is through breathing hence it causes fetal effect on lungs.

Q 34. Strong and ductile material are

A. Polymer

B. Ceramics

C. Metals

D. Semiconductors

Answer: - Option C

Explanation: - Metals Strong and ductile because of presence of metallic bond in it.

Q 35. What are insulating material that can tolerate maximum temperature?

A. Mica

B. Ceramic

C. Glass

D. All the above

Answer: - Option D

Explanation: - All the above material has high thermal stabilities

Q 36. How many classes of insulating material are there?

- A. 6
- B. 7
- C. 5
- D. 8

Answer: - Option B

Explanation: - 7 insulating material classes are: Y, A, E, B, F, H and C.

Q 37. The value of dielectric constant of an air is _____

- A. less than 1
- B. Zero
- C. equal to 1
- D. not determined

Answer: - Option C

Explanation: - Because the value of the dielectric constant for air is nearly the same as that for a vacuum

Q 38. The materials which exhibits the same elastic properties in all directions is called

- A. Isotropic
- B. Isentropic
- C. Inelastic
- D. Visco elastic

Answer: - Option A

Explanation: - Isotropy is uniformity in all orientations; it is derived from the Greek isos

Q 39. Glass is a mixture of

- A. Non metallic silicates
- B. Metallic silicates
- C. Metallic acetate
- D. Non metallic acetate

Answer: - Option B

Explanation: - Glass is a homogeneous mixture of super-cooled molten sodium silicate and calcium silicate.

Q 40. What changes are observed when glass is heated?

- A. It becomes softer
- B. It bursts
- C. It solidifies
- D. It disintegrates

Answer: - Option A

Explanation: - Because on heating glass melts and the surface of the liquid tends to take the rounded shape at the edges which has minimum surface area.

Q 41. Natural rubber contain which polymer of organic compound

- A. Polyprene
- B. Neoprene
- C. Thiokol
- D. Isoprene

Answer: - Option D

Explanation: - Isoprene is a hemiterpene with the formula $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}=\text{CH}_2$; the monomer of natural rubber

Q 42. What is added to rubber to make it a thermosetting polymer?

- A. Potassium
- B. Sulphur
- C. Sodium
- D. Phosphorous

Answer: - Option B

Explanation: - Sulphur helps for cross linking of polymers

Q 43. Rubber latex used for

- A. Bonding wood plys
- B. bonding rubber to walls
- C. bonding rubber to wood
- D. bonding tools

Answer: - Option C

Explanation: - Natural rubber latex is most commonly used to make items like gloves

Q 44. Recycled crumb rubber can be used in _____

- A. Plastering
- B. Mortar
- C. Paints
- D. Concrete

Answer: - Option D

Explanation: - Recycled rubber gives us innovative ways to reduce waste while solving important challenges

Q 45. What is resilience?

- A. Strength
- B. Elasticity
- C. soundness
- D. Durability

Answer: - Option B

Explanation: - Resilience is the capacity to recover quickly from difficulties; toughness.

Q 46. Rubber bricks are generally used for

- A. Roofing
- B. Walls
- C. Flooring
- D. Lining pizza ovens

Answer: - Option C

Explanation: - Durable and shock absorbing material

Q 47. Hardness of rubber is measured on which scale

- A. Rockwell scale
- B. Shore scale
- C. Mohr's scale
- D. Vicker's scale

Answer: - Option B

Explanation: - The Shore A scale is used for 'softer' rubbers while the Shore D scale is commonly used for 'harder' ones.

Q 48. Synthetic rubber is also called as

- A. Gum rubber
- B. Caoutchouc
- C. Buna-S
- D. Gum elastic

Answer: - Option C

Explanation: - Nitrile rubber, also known as nitrile butadiene rubber, NBR, Buna-N, and acrylonitrile butadiene rubber, is a synthetic rubber derived from acrylonitrile (ACN) and butadiene

Q 49. The word 'ceramic' is meant for

- A. Soft material
- B. Hard material
- C. Burnt material
- D. Dry material

Answer: - Option C

Explanation: - If the burnt fabric is polyester, acetone nail-polish remover will also get rid of it.

Q 50. Which is not characteristic property of Ceramic Material

- A. High temperature stability
- B. High mechanical strength
- C. Low elongation
- D. Low hardness

Answer: - Option C

Explanation: - Ceramic Material is not elastic

Q 51 Presence of which material in aluminium alloy provides ductility to the alloy?

- A. Iron
- B. Copper
- C. Zinc
- D. Silicon

Answer: - Option C

Explanation: - Copper is more Ductile than aluminum

Q 52. Which furnace is not used for heating aluminium alloys?

- A. Electricarcfurnace
- B. Potfurnace
- C. Inductionheatingfurnace
- D. Cruciblefurnace

Answer: - Option A

Explanation: - Aluminium alloys can be melted or heated directly or indirectly by fuel firing furnace. The heating can take place in a pot furnace, induction heating furnace, a crucible furnace or a reverberatory furnace.

Q 53. Type K thermocouple is made of the following metals

- A. iron and constantan
- B. chromel and alumel
- C. copper and constantan
- D. aluminium and tungsten

Answer: - Option B

Explanation: - Has a wide temperature range

Q 54. Which of the following will give highest output for the same value of hot and cold junction temperature?

- A. Platinum=Platinum +Rhodium
- B. Iron –Constantan
- C. Chromel constantan
- D. all will give the same output

Answer: - Option C

Explanation: - Chromel is an alloy made of approximately 90% nickel and 10% chromium by weight so make the positive conductors

Q 55. Which thermocouple can be used to measure a temperature of around 1400°C

- A. Platinum=Platinum +Rhodium
- B. Iron –Constantan
- C. chromel constantan
- D. None of these

Answer: - Option A

Explanation: - High physical constant of platinum

Q 56.is not a nikel alloy

- A. Alumel
- B. Constantant
- C. Chromel
- D. Amalgam

Answer: - Option D

Explanation: - Amalgam is an alloy of mercury

Q 57. Constantan is also name as the

- A. advance
- B. ferry
- C. eureka
- D. All of these

Answer: - Option D

Explanation: - copper–nickel alloy

Q 58. out of which is an insulating material?

- A. copper
- B. gold
- C. mica
- D. silver

Answer: - Option C

Explanation: - mica is not metal

Q 59. Nichrome wire is an alloy alloy of.....

- A. lead and zinc
- B. Chromium and vanadium
- C. chromium and nickel
- D. Copper and silver

Answer: - Option C

Explanation: - 80% nickel and 20% chromium

Q 60. Silicon fluid is a.....

- A. liquid insulator
- B. solid insulator
- C. gaseous insulator
- D. semisolid insulator

Answer: - Option

Explanation: - fluid is in liquid state

Q 61. Glass is a.....

- A. transparent solid
- B. transparent Supercooled liquid
- C. Coloured solid
- D. None of these

Answer: - Option B

Explanation: - Glass can only be molded at very high temperatures. It completely melts/liquifies at approximately 1400 °C to 1600 °C hence it act as super cooled liquid at room temprature

Q 62. which of the following monomer give the polymer neoprene on polymerization?

- A. $H_2C=CHCl$
- B. $CCl_2=Cl_2$
- C. $H_2C-CCl-CH=CH_2$
- D. $F_2C=CF_2$

Answer: - Option C

Explanation: - For suffix Neo there must be the three C atoms in compound

Q 63. Chromel constantant maketype of couple

- A. K
- B. E
- C. J
- D. R

Answer: - Option B

Explanation: - Chromel-constantan thermocouples (Type E) give the highest measurement

Q 64. Which substance is added to the dilute latex to coagulate rubber?

- A. Acetic acid
- B. Sodium salt
- C. Oil
- D. Water

Answer: - Option A

Explanation: - Ethanoic acid is an organic acid. It ionises in water to produce hydrogen ions. The positive hydrogen ions help to neutralise the negatively-charged rubber particles, allowing the latex to coagulate.

Q 65. Which of the following is a monomer in natural rubber?

- A. vinyl chloride
- B. ethylene chloride
- C. isoprene
- D. chlorine

Answer: - Option C

Explanation: - The chemical name for natural rubber is polyisoprene. Its IUPAC name of isoprene is 2-methyl but-1,3-diene.

Q 66. What are the essential process through which rubber latex undergo to give natural rubber?

- A. tapping-dilution-coagulation
- B. dilution-tapping-coagulation
- C. tapping- coagulation- dilution
- D. coagulation-dilution-tapping

Answer: - Option A

Explanation: - Correct sequence

Q 67. The milky soap of rubber tree is known as.....

- A. polymer
- B. supernanent
- C. latex
- D. wax

Answer: - Option C

Explanation: - latex is milky white and obtained from rubber tree

Q 68. What kind of synthetic rubber are commonly known as thiokols?

- A. polyurethane rubber
- B. Polysulphide rubber
- C. fluorocarbon rubber
- D. polyacrylic rubber

Answer: - Option B

Explanation: - In chemistry suffix Thio means Sulfur containing

Q 69. Polymerization in which two or more chemically different monomers take part is called

- A. Addition polymerization
- B. Copolymerization
- C. Chain polymerization
- D. None of these

Answer: - Option B

Explanation: - As definition of Co-polymerization

Q 70. Natural rubber is.....

- A. Polyisoprene
- B. Thiokol
- C. chloroprene
- D. Buna-S

Answer: - Option A

Explanation: - isoprene is natural monomer

Q 71. Buna-S is obtained from.....

- A. Butadiene +styrene
- B. Adipic acid + Hexdiamine
- C. Urea + Formaldehyde
- D. Chloroprene

Answer: - Option A

Explanation: - As Text above

Q 72. Chloroprene is the repeating unit in

- A. polystyrene
- B. neoprene
- C. styrene rubber
- D. butyl rubber

Answer: - Option C

Explanation: - As Text above

Q 73. Buna S is.....

- A. thiokol
- B. neoprene
- C. PVC
- D. styrene rubber

Answer: - Option D

Explanation: - As Text above

Q 74. The material which on stretching elongated and resumes its size on releasing the stress is.....

- A. plastic
- B. alloy
- C. elastomer
- D. all of these

Answer: - Option C

Explanation: - Rubber can again regain its original dimensions (length) as stress is released in it.

Q 75. Vulcanisation is the process of heating crude rubber with.....

- A. Sodium
- B. phosphorus
- C. carbon
- D. Sulphur

Answer: - Option D

Explanation: - Vulcanization (British: Vulcanization) is a range of processes for hardening rubbers by adding Sulfur.

Q 76. The size of nanoparticles is between.....nm

- A. 100 to 1000
- B. 0.1 to 10
- C. 1 to 100
- D. 1 to 10

Answer: - Option C

Explanation: - According to the definition of nanoparticle.

Q 77. Carbon atom makestypes of bond with other carbon atom.

- A. Covalent
- B. Ionic
- C. Metallic
- D. Hydrogen

Answer: - Option A

Explanation: - Both the C atoms forms bond by sharing of electrons

Q 78. In the structure of fullerene, each carbon atom form covalent bond with.....other carbon atom

- A. one
- B. two
- C. three
- D. four

Answer: - Option C

Explanation: - C atom in fullerene is SP³ hybridized

Q 79. Who had invented the famous Geodesic dome structure ?

- A. Etic Drexler
- B. Buckminster fuller
- C. . Richard Smalley
- D. Faraday

Answer: - Option B

Explanation: - Buckminster fuller was an American architect who was builds buildings having shape of soccer ball

Q 80. The compressive strength of nanotubeits tensile strength

- A. is less than
- B. is greater than
- C. is equal
- D. may be greater than

Answer: - Option A

Explanation: - Density of material is higher

Q 81. Which of the following is an approach for preparation of graphene from graphite?

- A. Etching
- B. exfoliation
- C. lithography
- D. alloying

Answer: - Option B

Explanation: - Exfoliation is an approach for preparation of graphene from graphite.

Q 82. Which of the following is the principal factor which causes the properties of nanomaterials to differ significantly from other material.

- A. Size distribution
- B. Specific surface area
- C. Quantum size effect
- D. All of these

Answer: - Option D

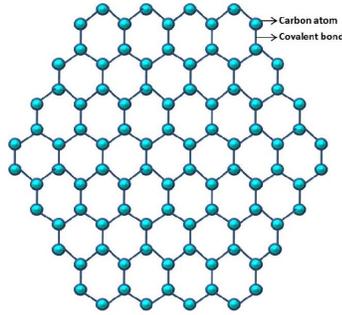
Explanation: - As text above

Q 83. In a molecule of graphene, atom of carbon is bonded into....

- A. Spherical structure
- B. Tube structure
- C. Honeycomb structure
- D. All of these

Answer: - Option C

Explanation: Structure of graphene is as honeycomb



Q 84.is potential nanomaterial for future applications in various field

- A. Fullerene
- B. silicon
- C. graphene
- D. copper

Answer: - Option C

Explanation: - Graphene has huge applications in various fields

Q 85. Most graphene parents have been taken in the world by.....

- A. Samsung
- B. Ocean's king lighting
- C. IBM
- D. Nokia

Answer: - Option

Explanation: - Graphene used by Samsung company to produce good quality of batteries

Q 86. The ability of metal to take exact dimensions of the mould is.....

- A. Tensile strength
- B. Casting
- C. Stiffness
- D. Refractoriness

Answer: - Option B

Explanation: - Liquid metal pour in three dimensional case

Q 87. Which metal is found in liquid state at room temperature?

- A. Fe
- B. Zn
- C. Hg
- D. Al

Answer: - Option C

Explanation: - As it has a very low melting point of -39C

Q 88.is the process of uniting two pieces of metal by means of heat

- A. Casting
- B. forging
- C. welding
- D. brazing

Answer: - Option C

Explanation: - Welding is a fabrication process that joins materials

Q 89. If metal breaks easily, it is said to be.....

- A. Magnetic
- B. Conductive
- C. Brittle
- D. Luster

Answer: - Option C

Explanation: - Having hardness and rigidity but little tensile strength; breaking readily with a comparatively smooth fracture

Q 90. Which property is NOT shown by metal?

- A. electrical conduction
- B. electrical insulation
- C. sonorous in nature
- D. ductility

Answer: - Option

Explanation: - electrical insulation means bad conductors of electricity

Q 91. Which of the following is the best electrical conductor?

- A. Copper
- B. Aluminium
- C. Platinum
- D. Nickel

Answer: - Option A

Explanation: - Copper is a metal made up of copper atoms closely packed together. The electrons can move freely through the metal.

Q 92. Which of the following describe metals?

- A. malleable and ductile
- B. solid, liquid and gaseous at room temperature
- C. dull and brittle
- D. semiconductors

Answer: - Option A

Explanation: - metals are malleable and ductile

Q 93. Fullerene is prepared by.....

- A. exfoliating
- B. by evaporating graphite
- C. by dissolving graphite
- D. by grinding graphite

Answer: - Option B

Explanation: - Fullerene is prepared by evaporating graphite.

Q 94. Graphene is prepared by

- A. Exfoliating graphite
- B. By evaporating graphite
- C. By dissolving graphite
- D. By grinding graphite

Answer: - Option A

Explanation: - Graphene is prepared by exfoliating graphite.

Q 95. Condensation is a physical change in which

- A. liquid change to gas state
- B. gas changes to liquid state
- C. liquid change to solid
- D. solid changes to gas state

Answer: - Option B

Explanation: - Change of state is the physical process in which a substance changes from one form to another by changing temperature

Q 96. Distillation is the process of

- A. Converting a solid into gas
- B. Converting gas into liquid
- C. Separating a liquid and solid
- D. Separating useful component of a substance

Answer: - Option D

Explanation: - Distillation is the useful to separate liquid components of liquid

Q 97.is building unit of graphite

- A. Silicon
- B. carbon
- C. Graphene
- D. fullerene

Answer: - Option C

Explanation: - Hexagonal plane rings of graphene is building block of graphite

Q 98. Unit operation of unit process may be.....

- A. Physical method
- B. Chemical method
- C. Both a & b
- D. None of these

Answer: - Option C

Explanation: - As text above

Q 99. Mass balance is a....

- A. Quantity
- B. Energy
- C. Process
- D. Property

Answer: - Option A

Explanation: - As mass is amount or quantity.

Q 100. The process of heating a liquid mixture to form vapours and then cooling the vapours to get pure component is called

- A. Crystallisation
- B. Distillation
- C. Chromatography
- D. Sublimation

Answer: - Option B

Explanation: - Distillation is process of purification

Q 101. The boiling point of chloroform is

- A. 334 K
- B. 286 K
- C. 350 K
- D. 298 K

Answer: - Option

Explanation: - 334 K = 61 °C

Q 102. Porcelain pieces are put into the distillation flask to avoid

- A. Overheating
- B. Uniform boiling
- C. Bumping of the solution
- D. None of the mentioned options

Answer: - Option C

Explanation: - Because of Porcelain pieces big bubble formation is quite difficult while boiling

Q 103. The boiling point of aniline is

- A. 438 K
- B. 370 K
- C. 338 K
- D. 457 K

Answer: - Option D

Explanation: - 457 K = 184 °C

Q 104. How aniline and chloroform can be separated?

- A. Sublimation
- B. Condensation
- C. Distillation
- D. Evaporation

Answer: - Option C

Explanation: - Distillation is the process by which we can separate two liquids on the basis of difference in their boiling points

Q 105. Which of the following is not separated through distillation process?

- A. Acetone and water
- B. Aniline and chloroform
- C. Impurities in Sea water
- D. Milk and water

Answer: - Option D

Explanation: - Its homogeneous mixture and milk itself contains little bit water.

Q 106. Which of the following will vaporize faster?

- A. Aniline
- B. Chloroform
- C. Water
- D. Kerosene

Answer: - Option B

Explanation: - Vapor pressure of chloroform is more and hence it is more volatile also.

Q 107. The distilled water is collected in

- A. Receiver
C. Condenser
- B. Adapter
D. Round bottom flask

Answer: - Option A

Explanation: - Receiver container in which distilled water collected during process of distillation

Q 108. The process of distillation is used for the liquids having

- A. Sufficient difference in their boiling point
C. Sufficient difference in their solubility
- B. Sufficient difference in their melting point
D. None of the mentioned

Answer: - Option A

Explanation: - Sufficient difference in their boiling point makes easy to separate at different temperature

Q 109. _____ is the change of vapour in a non-condensable gas.

- A. Saturation
C. Condensation
- B. Vaporization
D. None of the mentioned

Answer: - Option C

Explanation: - When vapour is cooled at constant total system volume, the pressure changes.

Q 110. In a condensation process, _____ to _____

- A. Gas, Solid
C. Liquid, Gas
- B. Gas, Liquid
D. Liquid, Solid

Answer: - Option B

Explanation: - Vapors are in gaseous state cooled and converted in to liquid

Q 111. When vapour is cooled at constant total system volume, the _____ changes.

- A. Volume
C. Temperature
- B. Pressure
D. None of the mentioned

Answer: - Option B

Explanation: - Vapor has larger volume than liquids

Q 112. Condensation starts _____ point.

- A. Dew point
C. Triple point
- B. Bubble point
D. None of the mentioned

Answer: - Option A

Explanation: - The dew point is the temperature the air needs to be cooled to (at constant pressure) in order to achieve a relative humidity (RH) of 100%.

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