PHYSICS

1. A motor car of mass 300kg is moving with a velocity of 30km/h. By the application of the brakes, it is brought to rest in a distance of 15 m. The average force resisting the motion is approximately

   (A) 263 N (B) 363 N
   (C) 463 N (D) 563 N

2. If a particle moves in a circle, describing equal angles at equal intervals, the velocity vector

   (A) remains constant
   (B) changes in direction
   (C) changes in magnitude
   (D) changes both in magnitude and direction

3. The difference of pressure between the inside and outside of spherical drop of water of radius 1 mm, for the surface tension of 0.073N/m, is

   (A) 73 N/sq.m (B) 36.5 N/sq.m
   (C) 109.5 N/sq.m (D) 146 N/sq.m

4. The lowest possible temperature that can be measured by a mercury thermometer is

   (A) $0^{\circ}C$ (B) $4^{\circ}C$
   (C) $-20^{\circ}C$ (D) $-4^{\circ}C$

5. The Bunsens' ice calorimeter is based on the principle

   (A) ice expands on melting (B) ice contracts on melting
   (C) ice floats in water (D) ice melts in water

6. The rms velocity of the molecules of a gas at $15^{\circ}C$ is 1.8×10^{3} m/s. The rms velocity at $119^{\circ}C$ is

   (A) 2100 m/s (B) 4200 m/s
   (C) 1050 m/s (D) 1800 m/s

7. The law of equipartition of energy was postulated by

(A) Maxwell (B) Boltzman
(C) Stefan (D) Weins

8. The efficiency of a Carnot cycle is maximum when

(A) the temperature of the sink is zero
(B) the temperature of the source is zero
(C) the temperature of the source is infinity
(D) the temperature of the sink is infinity

9. Two plane mirrors are placed perpendicular to each other. A ray strikes the first mirror and after reflection from the first mirror it falls on the second mirror. The ray after reflection from the second mirror is

(A) perpendicular to the original ray
(B) at 45 degree to the original ray
(C) parallel to the original ray
(D) at 60 degree to the original ray

10. A lens of power +2 dioptre is placed in contact with a lens of power –1 dioptre. The combination will behave as a

(A) convergent lens of focal length 50 cm
(B) convergent lens of focal length 100 cm
(C) divergent lens of focal length 50 cm
(D) divergent lens of focal length 100 cm

11. Spherical aberration can be removed by using

(A) concave lens (B) convex lens
(C) plane convex lens (D) cylindrical lens

12. Fraunhofer's lines are found in

(A) continuous spectra (B) absorption spectra
(C) emission spectra (D) band spectra

13. A capacitor stores 5.3×10^{-5} C of charge when connected across a 6 V battery. How much charge does the capacitor store when connected to a 9 V battery?

(A) 79.5×10^{-5} C (B) 91.5×10^{-5} C
(C) 81.5×10^{-5}C (D) 71.5×10^{-5}C

14. In a radioactive decay experiment, 10 counts are recorded in a 100 sec interval. Assuming Poisson distribution, the probability of detecting 8 counts in a 100 sec interval is

(A) 0.23 (B) 0.213
(C) 0.13 (D) 0.113

15. A pi- meson will always decay into

(A) two photons (B) two neutrons
(C) two leptons (D) an exciton

16. The stem or leaves of the plant are periodically tested for radioactivity using –

(A) G.M.Counter (B) Proportional counter
(C) Photographic plates (D) radiation counter

17. 1keV =_____J

(A) 1.6×10^{-20} (B) 1.6×10^{-10}
(C) 1.6×10^{-19} (D) 1.6×10^{-16}

18. The top layer of 33 km thickness of the earth is called .....

(A) photosphere (B) crater
(C) crust (D) mantle

19. A body of mass is measured many times and the value is given as $m = 47.36 \pm 0.01$ g. The fractional error in m is

(A) 0.01% (B) 0.02%
(C) 0.03% (D) 0.04%

20. Varactors are special diodes with characteristics of

(A) wattage variable capacitance (B) voltage variable capacitance
(C) current variable capacitance (D) resistance variable capacitance

21. Electromagnetic equivalent of a mechanical spring constant is

(A) $\frac{1}{C}$ (B) C

(C) $\frac{4\pi}{C}$ (D) $\frac{1}{C^2}$

22. If nuclear accident happens in a nearby nuclear power plant, which of the following actions should **not** be taken?

(A) If you came from outdoors, take off all the clothes and seal them in a container tightly.
(B) Lock all the windows and doors and stay indoor with good shielding.
(C) Pay attention to any announcements from government departments.
(D) Sprinkle water all over the room.

23. Which of the following forms of energy released is dominant during the fission process of uranium-235?

(A) Kinetic energy of the fission fragments
(B) Gravitational potential energy
(C) Sound energy
(D) Light energy

24. Any two terminal network can be replaced by an equivalent voltage generator in series with a resistance. This theorem is

(A) Thevenin (B) Norton
(C) Kirchoff (D) Maxwel

25. The dimension of magnetic field in M, L, T and C (Coulomb) is given as

(A) $MLT^{-1}C^{-1}$ (B) $MT^{2}C^{-2}$
(C) $MT^{-1}C^{-1}$ (D) $MT^{-2}C^{-1}$

26. A body of mass m=3.513 kg is moving along the x-axis with a speed of 5.00 ms−1. The magnitude of its momentum is recorded as

(A) 17.6 kg ms−1 (B) 17.565 kg ms−1
(C) 17.56 kg ms−1 (D) 17.57 kg ms−1

27. A bomb of mass 16 kg at rest explodes into two pieces of masses of 4 kg and 12 kg. The velocity of the 12 kg mass is 4 ms−1. The kinetic energy of the other mass is

(A) 96 J
(B) 144 J
(C) 288 J
(D) 192 J

28. An electric dipole is placed at an angle of 30° to a non-uniform electric field. The dipole will experience

(A) a torque only
(B) a translational force only in the direction of the field
(C) a translational force only in a direction normal to the direction of the field
(D) a torque as well as a translational force

29. Needles N1, N2 and N3 are made of a ferromagnetic, a paramagnetic and a diamagnetic substance respectively. A magnet when brought close to them will

(A) attract all three of them
(B) attract N1 and N2 strongly but repel N3
(C) attract N1 strongly, N2 weakly and repel N3 weakly
(D) attract N1 strongly, but repel N2 and N3 weakly

30. A player caught a cricket ball of mass 150 g moving at a rate of 20 m/s. If the catching process is completed in 0.1 s, the force of the blow exerted by the ball on the hand of the player is equal to

(A) 300 N
(B) 150 N
(C) 3 N
(D) 30 N

31. The resistance of a bulb filament is 100 Ω at a temperature of 100°C. If its temperature coefficient of resistance be 0.005 per °C, its resistance will become 200 Ω at a temperature of

(A) 200°C
(B) 300°C
(C) 400°C
(D) 500°C

32. Ball pen works on the principle of –

(A) Viscosity
(B) Boyle's law
(C) Gravitational force
(D) Capillarity and surface tension

33. An artificial satellite can be tracked very precisely from the earth by using

(A) Doppler effect
(B) Radar
(C) Sonar
(D) Zeeman effect

34. A quark is an elementary particle, and is classified as a .....

(A) photon
(B) fermion
(C) plasmon
(D) boson

35. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?

(A) No change
(B) Diffraction bands become narrower
(C) Bands become broader
(D) Bands disappear

36. Force between two charges each of one coulomb that are placed one metre apart is

(A) 9×10^9 N
(B) 19×10^9 N
(C) 8×10^9 N
(D) 18×10^9 N

37. The mass liberated during electrolysis depends on

(A) current
(B) time for which the current is passed
(C) current and time for which it is passed
(D) current/ time

38. The resistance of a copper wire of length 1metre is 0.1 ohm. If the diameter of the wire is 0.045 cm, the specific resistance is

(A) 1.59 milli ohm-cm
(B) 1.59 micro ohm-cm
(C) 1.59 ohm-cm
(D) 1.59 ohm/cm

39. The path of cathode rays in an electric field can be approximated to a circle of radius R. In order to double the radius of the circular path, we must

(A) double the electric field
(B) halve the electric field
(C) make the electric field four times
(D) make electric field ¼ of its initial value

40. ORTHORHOMBIC system is defined by

(A) $a = b = c$ (B) $a = b \neq c$
(C) $a \neq b \neq c$ (D) $a \neq b = c$

41. If $\vec{A}.\vec{B} = \vec{A} \times \vec{B}$ the resultant vector of $\vec{A}$ and $\vec{B}$ is

(A) $\sqrt{A^2 + B^2 + \sqrt{2AB}}$ (B) $(A - B)$
(C) $\sqrt{A^2 + B^2}$ (D) $(A + B)$

42. Two bodies are thrown up with initial velocities in the ratio 2:5. The ratio of maximum height reached by them is

(A) 1 : 2 (B) 2 : 5
(C) 4 : 25 (D) 5 : 2

43. Which one of the following forces is non-conservative?

(A) Electrostatic force (B) Nuclear force
(C) Elastic force (D) Viscous force

44. An artificial satellite is orbiting the earth at an altitude 400 km. A bomb is released from the satellite. The bomb will

(A) reach earth in 10 minutes
(B) reach earth in 30 minutes
(C) orbit the earth along with the satellite
(D) None of these

45. If two electrons are forced to come closer to each other, the P.E. of the system of two electrons will:

(A) become zero (B) increase
(C) decrease (D) become ∞

46. A car and a bus are moving with the same Kinetic Energy. They are brought to rest by applying brakes which provide equal retarding forces. The distances covered by them before coming to rest will be:

(A) inversely proportional to the square of their masses
(B) inversely proportional to their masses
(C) directly proportional to their masses
(D) equal

47. A sphere, disc and a ring each having same mass M and radius R roll down without slipping from an inclined plane. Which of the three will reach foot of inclined plane first?

(A) Ring
(B) Disc
(C) Sphere
(D) All the three will reach at the same time

48. If the earth shrinks to half of its radius without change in mass, the duration of the day will be:

(A) 24 hr.
(B) 48 hr.
(C) 13 hr.
(D) 6 hr.

49. An iron bar of length l and cross-section A is heated from 0°C to 100°C. If the rod is so held that it is not permitted to expand or bend, the force developed in it is :

(A) directly proportional to length
(B) inversely proportional to length
(C) independent of length
(D) inversely proportional to area of cross-section

50. A liquid tends to assume a spherical shape. It is because of

(A) the surface tension force
(B) the viscous force
(C) the gravity effect
(D) none of these

51. When two tubes of different diameters are dipped vertically, the rise of liquid is

(A) same in both tubes
(B) more in tube of larger diameter
(C) more in tube of smaller diameter
(D) none of these

52. Which of the following substances has largest value of viscosity?

(A) Mercury
(B) Water
(C) Oxygen
(D) Glycerine

53. Lissajous figure obtained by combining $x = A\sin\omega t$ and $y = A\sin(\omega t + \pi/4)$ will be :

(A) an ellipse
(B) a circle
(C) a straight line
(D) a parabola.

54. A mass M is suspended from a light spring. An additional mass m added displaces the spring further by a distance x. Now the combined mass will oscillate on the spring with a period :

(A) $T = 2\pi\sqrt{\frac{mg}{x(M+m)}}$
(B) $T = 2\pi\sqrt{\frac{(M+m)x}{mg}}$
(C) $T = 2\pi\sqrt{\frac{(M+m)}{mgx}}$
(D) $T = 2\pi\sqrt{\frac{mgx}{(M+m)}}$

55. The intensity of plane progressive wave of frequency 100 Hz is 10 watt/m^2. Given that speed of sound is 330 m/s and density of air is: 1.293kg/m^3, then maximum change in pressure in N/m^2 is

(A) 3×10^{-4}
(B) 3×10^{-5}
(C) 3×10^{-3}
(D) 3×10^{-2}

56. When sound travels from air to water the quantity that remains unchanged is:

(A) speed
(B) frequency
(C) intensity
(D) wavelength

57. The internal energy of the ideal gas does not change during

(A) isothermal process
(B) isocharic process
(C) isobaric process
(D) adiabatic process

58. Compressed air coming out of punctured football becomes cooler because of

(A) adiabatic
(B) Joule Thomson effect
(C) isothermal expansion
(D) energy dissipation

59. Find the electric field strength if the potential of field depends upon x, y co-ordinate as $\phi = a(x^2 - y^2)$

(A) $E = 2a\sqrt{x^2 + y^2}$
(B) $E = a\sqrt{x^2 + y^2}$
(C) $E = \frac{a}{2}\sqrt{x^2 + y^2}$
(D) $E = a\sqrt{\frac{1}{x^2 + y^2}}$

60. Given three equal resistances, how many combinations of these resistances are possible ?

(A) 3 (B) 4
(C) 5 (D) 6

61. A house wiring supplied with a 220 V supply line is protected by a 9 amp fuse. The maximum number of 60 W bulbs in parallel that can be turned is -

(A) 44 (B) 33
(C) 22 (D) 11

62. Two protons move parallel to each other with equal speeds 3×10^5 ms^{-1}. The ratio of magnetic and electric force between them is

(A) 10^{-3} (B) 10^{-6}
(C) 10^{-9} (D) 1

63. Two concentric coils of 10 turns each are situated in the same plane. Their radii are 20 and 40 cm and they carry respectively 0.2 and 0.3 ampere current in opposite direction. The magnetic field in Wb/m^2 at the centre is

(A) $\frac{2}{3}\mu_o$ (B) $\frac{5}{4}\mu_o$
(C) $\frac{1}{4}\mu_o$ (D) $\frac{1}{6}\mu_o$

64. If a particle is moving in a uniform magnetic field, then

(A) its momentum changes but total energy remains the same
(B) both momentum and total energy remains the same
(C) its total energy changes but momentum remains the same
(D) both momentum and total energy will change

65. Which of the following substances has negative permeability and very large value of susceptibility ?

(A) Ferromagnetic (B) Paramagnetic
(C) Diamagnetic (D) None of the above

66. Permanent magnets are made of steel because steel has

(A) low retentivity and low coercive field
(B) high retentivity and high coercive field
(C) low retentivity and high coercive field
(D) high retentivity and low coercive field

67. When a diamagnetic substance is brought near north or south pole of a bar magnet, it is

(A) attracted by the poles
(B) repelled by the poles
(C) attracted by north pole and repelled by south pole
(D) repelled by north pole and attracted by south pole

68. The voltage of A.C. source varies with time according to equation, $V=120 \sin 100\pi t \cos \pi t$. Then frequency of source is

(A) 50 Hz (B) 100 Hz
(C) 150 Hz (D) 200 Hz

69. The equivalent inductance of two inductors is 2.4 H when connected in parallel and 10 H when connected in series. Then individual inductances are

(A) 6H, 4H (B) 5H, 5H
(C) 7H, 3H (D) 8H, 2H

70. In a Huygen's eye-piece, the eye lens has a focal length f. The equivalent focal length of eye piece is

(A) $\frac{3}{4}f$ (B) 4f
(C) 2f (D) $\frac{3}{2}f$

71. If a narrow beam of white light goes through a slab having parallel faces, then

(A) the light inside the slab is white
(B) the light inside the slab is split into different colours
(C) the emergent beam is not white
(D) the light never splits in different colours.

72. In Young's double slit experiment, if the widths of slit are in the ratio 4 : 9, the ratio of intensity of maxima and minima will be

(A) 25 : 1 (B) 9 : 4
(C) 3 : 2 (D) 81 : 16

73. A parallel beam of light of wavelength 5000A° is incident normally on a single slit of width 0.001mm.The light is focussed by a convex lens on a screen placed in focal plane. The first minimum is formed for the angle of diffraction equal to

(A) 0° (B) 15°
(C) 30° (D) 60°

74. When a gun is shot in the front of a cliff and the echo of the sound is heard after three seconds, what would be the distance from the gun to the cliff if the speed of sound in air is 330 m/s ?

(A) 220 m (B) 110 m
(C) 445 m (D) 990 m

75. Half life of a substance is 20 minutes. What is the time between 33% decay and 67% decay ?

(A) 20 minutes (B) 25 minutes
(C) 30 minutes (D) 40 minutes

CHEMISTRY

76. The emission of a beta particle from a radioactive element increases the positive charge by

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

77. Which of the following show paramagnetic character?

(A) NO (B) CO_2
(C) H_2O (D) SO_2

78. Which among the following does not represent an organometallic compound?

(A) $Zn(C_2H_5)_2$ (B) C_2H_5MgX
(C) $Pb(C_2H_5)_4$ (D) Mg acetate

79. The IUPAC name of tert-butyl iodide is

(A) 2-iodo-3-methyl propane
(B) 2-iodo-butane
(C) 2-iodo-2-methyl propane
(D) 2-iodo-1-methyl propane

80. Which species has the greatest value for the bond dissociation energy?

(A) O_2
(B) O_2^{2+}
(C) O_2^{2-}
(D) O_2^-

81. The compound that is formed on refluxing benzaldehyde with alcoholic solution of KCN is

(A) Phenyl cyanide
(B) Phenyl isocyanide
(C) Benzoin
(D) Phenyl cyanate

82. In B_2H_6

(A) there is a direct B-B bond
(B) the structure is similar to that of C_2H_6
(C) the boron atoms are linked through hydrogen bridges
(D) all the atoms are in one plane

83. Which among the following oxides will give the metal on heating?

(A) ZnO
(B) Al_2O_3
(C) HgO
(D) TiO_2

84. Which among the following pairs have the same electronic configuration as that of F^-?

(A) Na^+ and Mg^{2+}
(B) Mg^{2+} and Na
(C) O^{2-} and Na
(D) Ne and Na

85. Which of the following sets of quantum numbers is acceptable?

(A) (1, 0, 1/2, −1/2)
(B) (2, 2, 1, +1/2)
(C) (3, 0, 0, +1/2)
(D) (3, 2, 1, 1)

86. The number of coulombs of charge required for the conversion of 1 mole $KMnO_4$ to Mn^{2+} is

(A) 5 C
(B) 5 × 96500 C
(C) 7 × 96500 C
(D) 2 × 96500 C

87. The osmotic pressures of 0.005M of KI and glucose at 300 K are 0.246 and 0.123 atm. The value of the ratio of van't Hoff factor is

(A) 1 (B) 3
(C) 2 (D) 0

88. The most unstable free radical is

(A) CH_3. (B) $C_2H_5CH_2$.
(C) $(CH_3)_3C$. (D) $(CH_3)_2CH$.

89. The ionization energies of Mg, Al, Si and P are in the order

(A) Mg < Al < Si<P (B) Al < Mg < Si < P
(C) Si < P < Mg < Al (D) P < Si < Al < Mg

90. Identify the correct order of strengths of Lewis acids in the following:

(A) $BBr_3 > BCl_3 > BF_3$ (B) $BCl_3 > BBr_3 > BF_3$
(C) $BF_3 > BCl_3 > BBr_3$ (D) $BCl_3 > BF_3 > BBr_3$

91. The R M S velocities of the gases are in the order

(A) $H_2 > CH_4 > NH_3 > CO_2$ (B) $H_2 < CH_4 < NH_3 < CO_2$
(C) $H_2 < CH_4 > NH_3 > CO_2$ (D) $H_2 > CH_4 < NH_3 < CO_2$

92. The sugar that will not reduce Fehling's solution is

(A) Maltose (B) Lactose
(C) Sucrose (D) Glucose

93. The increasing order for the values of *charge*/mass, e/m, for proton, alpha particle and neutron is

(A) p, n, α (B) n, p, α
(C) n, α, p (D) α, n, p

94. The energy of an electron in the first Bohr orbit of a hydrogen atom is -2.18×10^{-18} J. Its energy in the second orbit would be

(A) -1.09×10^{-18} J (B) -5.45×10^{-19} J
(C) -4.36×10^{-18} J (D) -8.72×10^{-18} J

95. Which of the following dimensions represent a hexagonal unit cell?

(A) $a = b = c,\ \alpha = \beta = \gamma = 90^\circ$
(B) $a = b \neq c,\ \alpha = \beta = \gamma = 90^\circ$
(C) $a = b \neq c,\ \alpha = \beta = 90^\circ;\ \gamma = 120^\circ$
(D) $a \neq b \neq c,\ \alpha = \beta = \gamma = 90^\circ$

96. The coordination numbers of cation and anion in a rock salt type of structure are, respectively

(A) four and four
(B) six and four
(C) four and six
(D) six and six

97. The bond dissociation energies of $H_2(g)$, $Cl_2(g)$ and HCl(g) are 435, 243 and 431 $kJ.mol^{-1}$ respectively. The enthalpy of formation of HCl(g) in $kJ.mol^{-1}$, is

(A) −184
(B) −92
(C) 1109
(D) −1109

98. Which of the following constitute a buffer solution when dissolved in 500 mL water?

(A) 0.05 mol NaOH and 0.05 mol HCl
(B) 0.05 mol NaCl and 0.05 mol HCl
(C) 0.05 mol NaOH and 0.05 mol acetic acid
(D) 0.05 mol sodium acetate and 0.05 mol acetic acid

99. For a reaction $N_2 + 3H_2 \rightarrow 2NH_3$, the rate of formation of ammonia is found to be 2×10^{-3} $mol.dm^{-1}.s^{-1}$. The rate of consumption of H_2 is

(A) 1.0×10^{-3} $mol.dm^{-1}.s^{-1}$
(B) 2.0×10^{-3} $mol.dm^{-1}.s^{-1}$
(C) 3.0×10^{-3} $mol.dm^{-1}.s^{-1}$
(D) 4.0×10^{-3} $mol.dm^{-1}.s^{-1}$

100. An aqueous solution containing a non-volatile solute freeze at −0.186°C. The elevation in boiling point of the same solution ($K_f = 1.86^\circ$; $K_b = 0.512^\circ$) would be

(A) 0.186
(B) 0.512
(C) 0.0512
(D) 0.0186

101. Identify the TRUE statement with respect to the following carbides: Al_4C_3, CaC_2, BaC_2 and SiC

(A) All the carbides liberate methane on reaction with water
(B) Only Al_4C_3 and CaC_2 react with water liberating methane
(C) None of them react with water
(D) Only Al_4C_3 reacts with water liberating methane

102. Among $NaNO_3$, $Ba(NO_3)_2$, $Cu(NO_3)_2$ and $AgNO_3$, the one which gives metal on heating is

(A) $NaNO_3$ (B) $Ba(NO_3)_2$
(C) $Cu(NO_3)_2$ (D) $AgNO_3$

103. Which of the following mixture of ions can be separated by using excess of sodium hydroxide solution?

(A) Al^{3+} and Sn^{2+} (B) Al^{3+} and Zn^{2+}
(C) Al^{3+} and Fe^{3+} (D) Zn^{2+} and Sn^{2+}

104. Which one of the following statement is not true?

(A) Alkaline earth metals are harder and denser than alkali metals
(B) Alkaline earth metals have higher melting point than alkali metals
(C) Alkaline earth metals are more reactive than alkali metals
(D) The reactivity of alkaline earth metals increases down the group

105. The correct order of increasing oxidation state of N is

(A) N_2,NH_3,NO (B) NH_3, N_2, NO
(C) NH_3, NO, N_2 (D) NO, NH_3, N_2

106. The correct order of increasing acidity among the following is:

(A) benzoic acid < p-methoxybenzoic acid < p-nitrobenzoic acid
(B) p-nitrobenzoic acid < p-methoxybenzoic acid < benzoic acid
(C) p-methoxybenzoic acid < benzoic acid < p-nitrobenzoic acid
(D) Benzoic acid < p-nitrobenzoic acid < p-methoxybenzoic acid

107. When propionic acid is treated with aq. Sodium bicarbonate solution, CO_2 is evolved. The C of CO_2 comes from

(A) methyl group (B) carboxylic acid group
(C) methylene group (D) bicarbonate

108. The reagent which can be used to reduce only a –CHO group of an unsaturated aldehyde is

(A) Zn/HCl
(B) $LiAlH_4$
(C) $NaBH_4$
(D) NH_2NH_2

109. Which is the correct order with respect to the acidic nature of phenols?

(A) Phenol > o-cresol > o-nitrophenol
(B) Phenol < o-cresol < o-nitrophenol
(C) o-cresol < phenol < o-nitrophenol
(D) o-cresol < o-nitrophenol < phenol

110. An aqueous solution of 6.3g of oxalic acid dihydrate is made upto 250 mL. The volume of 0.1 N NaOH required to completely neutralize 10 mL of this solution is

(A) 10 mL
(B) 20 mL
(C) 40 mL
(D) 4 mL

111. Benzoic acid can be prepared by reacting phenyl magnesium bromide with

(A) HCHO
(B) CO_2
(C) $COCl_2$
(D) HCOOEt

112. The half life of a radioactive element is 4.8 minutes. If one were to start with 2 g of the element, how much will remain after 24 minutes ?

(A) 1g
(B) 0.125g
(C) 0.0625g
(D) 0.25g

113. On adding $CaCO_3$ to the equilibrium of the decomposition of lime stone,

(A) the equilibrium will be shifted to the right
(B) the equilibrium will be shifted to the left
(C) the equilibrium condition will not be affected
(D) more $CaCO_3$ will be decomposed

114. The order of reactivity of alcohols towards sodium metal is

(A) primary > secondary > tertiary
(B) primary < secondary < tertiary
(C) primary > secondary < tertiary
(D) primary < secondary > tertiary

115. Among the following the strongest base is

(A) $C_6H_5NH_2$ (B) p-NO_2-$C_6H_4NH_2$
(C) m-NO_2-$C_6H_4NH_2$ (D) $C_6H_5CH_2NH_2$

116. In a diatomic molecule, AB, the bond axis is taken as z-axis. Then which of the following orbitals will not have positive overlap?

(A) 2s(A) and 2s(B) (B) 2s(A) and $2p_x$(B)
(C) 2s(A) and $2p_z$(B) (D) $2p_z$(A) and $2p_z$(B)

117. In the primitive cubic unit cell of closest packed atoms, the radius of the atom, r, is related to the edge length, a, of the unit cell by the relation,

(A) $r = a/2$ (B) $r = a/2\sqrt{2}$
(C) $r = \sqrt{3}\, a/4$ (D) $r = \sqrt{2}\, a$

118. The K_{sp} for CaF_2 is 1.7×10^{-10}. In which of the following, will precipitation of CaF_2 ococur, when equal volume of the solutions are mixed ?

(A) 10^{-4} M Ca^{2+} and 10^{-4} M F^- (B) 10^{-2} M Ca^{2+} and 10^{-3} M F^-
(C) 10^{-5} M Ca^{2+} and 10^{-3} M F^- (D) 10^{-3} M Ca^{2+} and 10^{-5} M F^-

119. Identify the correct order of H-X-H bond angles in XH_3, where X = N, P or As.

(A) $NH_3 > PH_3 > AsH_3$ (B) $NH_3 < PH_3 > AsH_3$
(C) $NH_3 < PH_3 < AsH_3$ (D) $NH_3 > PH_3 < AsH_3$

120. Which of the following is the correct order of reactivity towards a nucleophile?

(A) Acid anhydride > amide > ester
(B) Acid anhydride > ester > amide
(C) Amide > ester > acid anhydride
(D) Amide > acid anhydride > ester

121. Assuming that petrol is octane (C_8H_{18}) and has a density of 0.8 g/mL, 1.425 L of petrol for complete combustion requires

(A) 50 moles of O_2 (B) 100 moles of O_2
(C) 125 moles of O_2 (D) 200 moles of O_2

122. The solubility of A_2X_3 is y mol.dm^{-3}. Its solubility product is

(A) $6y^4$ (B) $64y^4$
(C) $36y^5$ (D) $108y^5$

123. In the closest packing of atoms, the number of octahedral and tetrahedral voids present per atom are, respectively

(A) one and two
(B) two and one
(C) two and two
(D) one and zero

124. If the enthalpy of vaporization of water at 100°C is 37.3 $kJ.mol^{-1}$, then its entropy of vaporization would be

(A) 100.0 $J.K^{-1}.mol^{-1}$
(B) 373.0 $J.K^{-1}.mol^{-1}$
(C) 137.3 $J.K^{-1}.mol^{-1}$
(D) 510.3 $J.K^{-1}.mol^{-1}$

125. The E^0 values for Ag^+/Ag, K^+/K, Mg^{2+}/Mg and Cr^{3+}/Cr are 0.80, −2.93, −2.37 and −0.74 V respectively. The reducing power of the metals is in the order

(A) Ag > Cr > Mg > K
(B) Ag < Cr < Mg < K
(C) Ag > Cr > K > Mg
(D) Cr > Ag > Mg > K

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