

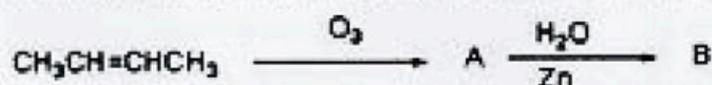
PHYSICS

- An object of size 10 cm is kept at a distance of 10 cm from a convex lens. If the focal length of the lens is 5 cm, the size of the image is
 - 10 cm
 - 20 cm
 - 5 cm
 - 15 cm
- A biconvex lens of focal length 10 cm is to be made from a glass material. If the refractive index of the material is 1.5, what must be the radius of curvature of the surface of the lens?
 - 0.1 m
 - 0.15 m
 - 0.20 m
 - 0.30 m
- A diffraction grating with 10^6 lines / m is used to determine the wavelength of a monochromatic source. The angle of first order diffraction is 30° . The wavelength of the source is
 - 1000 nm
 - 500 nm
 - 400 nm
 - 600 nm
- A glass plate of thickness $1.5 \mu\text{m}$ and refractive index 1.5 is introduced between one of the slits and screen in a Young's double slit experiment. If the wavelength of the monochromatic source used is $\lambda = 0.75 \mu\text{m}$, the phase difference between the interfering waves at the centre of the screen is equal to
 - 6π
 - 3π
 - π
 - 2π
- What is the velocity of light in a medium with refractive index 1.5?
 - 2×10^8 m/s
 - 3×10^8 m/s
 - 1.5×10^8 m/s
 - 2.5×10^8 m/s
- Which among the following electromagnetic radiations is the most energetic?
 - Infra red light
 - Visible light
 - Ultraviolet light
 - microwaves
- Which of the following particles has the shortest de-Broglie wavelength, if all of them move with same speed?
 - beta particle
 - alpha particle
 - proton
 - neutron

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CHEMISTRY

31. S_N1 reaction is favored by
- non polar solvents
 - more number of alkyl group on the carbon atom attached to the halogen atom
 - small groups on the carbon attached to the halogen atom
 - no groups on the carbon attached to the halogen atom
32. Phenol is less acidic than
- ethanol
 - o*-nitrophenol
 - o*-methylphenol
 - o*-methoxyphenol
33. Chloro ethane reacts with compound Z to form diethyl ether. Identify Z?
- NaOH
 - H_2SO_4
 - C_2H_5ONa
 - $Na_2S_2O_3$
34. Which of the following reagents may be used to distinguish between phenol and benzoic acid?
- Tollens' reagent
 - Molisch reagent
 - Neutral $FeCl_3$
 - Aqueous NaOH
35. In the following sequence of reactions, the alkene affords the compound 'B'.



The compound B is

- CH_3CHO
 - CH_3COCH_3
 - CH_3CH_2CHO
 - $CH_3CH_2COCH_3$
36. How many chiral carbons are there in β -D-(+)-glucose?
- five
 - six
 - three
 - four
37. Why are certain rubbers called as 'vulcanized rubber'?
- They are formed under volcanic eruption
 - They are prepared by adding 5% of sulphur as cross-linking agent
 - They do not use any co-monomer
 - By the addition of excessive co-monomer

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38. One of the common components of photochemical smog is
- | | |
|-----------------|------------------|
| a) formaldehyde | b) acetaldehyde |
| c) methane | d) CO_2 |
39. Sodium dodecylbenzenesulphonate refers to
- | | |
|-----------------------|-----------------------|
| a) anionic detergent | b) soap |
| c) cationic detergent | d) nonionic detergent |
40. Which one of the following acts as antihistamine?
- | | |
|---------------|---------------------|
| a) Equanil | b) Morphine |
| c) Serotonine | d) Bromophenylamine |
41. The actual atomic weight of an element is represented in
- | | |
|-----------|---------|
| a) number | b) "u" |
| c) "amu" | d) "mu" |
42. The weight of nascent oxygen in milligrams obtained from 6.32 g of potassium permanganate (Molecular weight 158) in acid medium is
- | | |
|---------|----------|
| a) 16 | b) 0.016 |
| c) 0.16 | d) 1.6 |
43. The value of Plank's constant in units of Js is
- | | |
|----------------------------|----------------------------|
| a) 6.626×10^{-34} | b) 6.626×10^{-23} |
| c) 6.626×10^{-27} | d) 1.38×10^{-23} |
44. The mass of proton having a wavelength of 4.2\AA is
- | | |
|------------------------------|-----------------------------|
| a) 4.78×10^{-33} kg | b) 4.78×10^{-33} g |
| c) 7.17×10^{-33} kg | d) 2.39×10^{-33} g |
45. The measurement of a thermodynamic property known as temperature is based on
- | | |
|---------------------------------|--------------------------------|
| a) zeroth law of thermodynamics | b) first law of thermodynamics |
| c) second law of thermodynamics | d) kirchoffs equation |
46. The bond dissociation enthalpies of $\text{H}_2(\text{g})$, $\text{Cl}_2(\text{g})$ and $\text{HCl}(\text{g})$ are 435, 243 and 431 kJ/mol respectively. The enthalpy of formation of $\text{HCl}(\text{g})$ in kJ/mol will be
- | | |
|---------|----------|
| a) 121 | b) -1211 |
| c) -121 | d) -242 |
47. Defective coating of zinc over mild steel leads to
- | |
|---------------------------------------|
| a) enhanced corrosion of mild steel |
| b) increase of corrosion potential |
| c) corrosion of zinc coating |
| d) hydrogen evolution over mild steel |

57. Which one of the following complexing agents is used for the estimation of hardness of water?
- a) Cyanide
b) Pyrophosphate
c) EDTA
d) Ethylene diamine
58. How many σ and π bonds are present in nitromethane
- a) 6 σ and 1 π
b) 5 σ and 2 π
c) 6 σ and 2 π
d) 5 σ and 1 π
59. Retardation factor is calculated as
- a) ratio between 'distance travelled by the substance from the base line and distance moved by the solvent from the base line'
b) ratio between 'distance travelled by the solvent from the base line and distance moved by the substance from the base line'
c) sum of 'distance travelled by the substance from the base line and distance moved by the solvent from the base line'
d) difference of 'distance travelled by the substance from the base line and distance moved by the solvent from the base line'
60. In which one of the following, Mn exhibits its highest oxidation state?
- a) MnO_2
b) MnO_4^{2-}
c) MnO_4^-
d) MnO
-

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66. Which one of the following is TRUE for any x

a) $\frac{1}{x+5} < \frac{1}{x+2} < \frac{1}{x+3}$

b) $\frac{1}{x+2} < \frac{1}{x+3} < \frac{1}{x+5}$

c) $\frac{1}{x+5} < \frac{1}{x+3} < \frac{1}{x+2}$

d) $\frac{1}{x+3} < \frac{1}{x+2} < \frac{1}{x+5}$

67. The order and degree of the differential equation $y - x \frac{dy}{dx} = \frac{a \frac{dy}{dx}}{\sqrt{1 + (\frac{dy}{dx})^2}}$ is

a) 1, 2

b) 1, 4

c) 1, $5\sqrt{2}$

d) 1, 3

68. The general solution of the differential equation $(1 + e^{(x/y)}) dx + e^{(x/y)} (1 - (x/y)) dy = 0$ is

a) $y + xe^{(x/y)} = C$

b) $x + ye^{(x/y)} = C$

c) $x + C = ye^{(x/y)}$

d) $y + ye^{(x/y)} = C$

69. The triangle with vertices $A = (2, 7)$, $B = (4, y)$ and $C = (-2, 6)$ is right angled at B if the value of y is

a) 10 or -3

b) -10 or -3

c) 10 or 3

d) 9 or 4

70. The point equidistant from the three lines $x + y = 1$, $y = 1$ and $x = 1$ is

a) $(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}})$

b) $(+\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}})$

c) $(+\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}})$

d) $(+\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{3}})$

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87. The equation of the plane through the intersection of the planes $2x - y + z = 6$ and $x + y + 2z = 7$ and passing through the point $(1, 1, 1)$ is

a) $2x - 7y - 5z + 10 = 0$

b) $2x - 7y + 5z + 10 = 0$

c) $2x - 7y - 5z - 10 = 0$

d) $2x + 7y - 5z - 10 = 0$

88. The equation of the line passing through the point $(1, 1, 0)$ and parallel to the plane $3x + 2y + z = 5$ is

a) $\frac{x-1}{-3} = \frac{y-1}{-2} = \frac{z}{1}$

b) $\frac{x+1}{3} = \frac{y+1}{2} = \frac{z}{1}$

c) $\frac{x-1}{3} = \frac{y-1}{2} = \frac{z}{1}$

d) $\frac{x-3}{1} = \frac{y-2}{1} = \frac{z-1}{0}$

89. The angle between the complex numbers $2 + 2i$ and -7 is

a) $\pi/2$

b) $\pi/4$

c) $3\pi/2$

d) $3\pi/4$

90. What is the value of $4 + 5\left(-\frac{1}{2} + i\frac{\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2} + i\frac{\sqrt{3}}{2}\right)^{365}$?

a) i

b) $\frac{\sqrt{3}}{2}$

c) $\frac{\sqrt{3}}{2}i$

d) $\sqrt{3}i$

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96. The equation $4x^2 + 7y^2 + 32x - 56y + 148 = 0$ represents

- a) an ellipse with center (4, -4)
- b) an ellipse with center (-4, 4)
- c) an ellipse with center (2, -2)
- d) an ellipse with center (-2, 2)

97. The equation for the circle obtained by shifting the circle $x^2 + y^2 = 49$ to 3 units down and 2 units left is:

- a) $(x+3)^2 + (y+2)^2 = 49$
- b) $(x-3)^2 + (y-2)^2 = 49$
- c) $(x-2)^2 + (y-3)^2 = 49$
- d) $(x+2)^2 + (y+3)^2 = 49$

98. The variance of a data set is k , then the variance of the data set obtained by shifting the original data to 3 units is

- a) $k - 3$
- b) $k + 3$
- c) k
- d) $3k$

99. Suppose that $P(A/B) = 0.7$, $P(A) = 0.5$ and $P(B) = 0.2$ then $P(B/A)$ is,

- a) 0.14
- b) 0.4
- c) 0.3
- d) 0.28

100. A medical test is capable of identifying someone with the illness as positive is 99% and someone without illness as negative 95%. If the illness is present in the general population with probability 0.0001, the probability for anyone to have illness when the medical test results positive is

- a) 0.00009
- b) 0.002
- c) 0.0001
- d) 0.9980

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