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SAMPLE QUESTION PAPER – 1

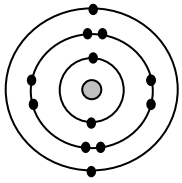
READ THE INSTRUCTIONS CAREFULLY

M. MARKS = 240
TIME: 2 HOURS

1. Please mention your **Name, Roll No.** on the OMR Answer Sheet. Also please mention on right hand bottom of answer sheet about **other Tutors of Maths, Physics, Bio. (If finalized)**
2. Question paper carries **80 questions**.
3. **Q. No. 1 to 80 (All Single Answers) [3 Marks each]**
   [**Negative Marking (-1)** for wrong answer].
4. Please Use **HB Pencil** for darkening the appropriate answer.
5. Any student adopting unfair means or disturbing other students or creating nuisance in the hall will be disqualified.
6. Switch off **your mobile** while in the **Examination Hall**
7. No body should leave the Hall until all Answer sheets are collected.

CHEMISTRY

1. The diagram given below represents an atom X. The formula of its phosphate will be



a. $X_2(PO_4)_3$ b. $X_3(PO_4)_2$ c. XPO_4 d. X_2PO_4

2. The atomic number of Na is 11 and Cl is 17. Na and Cl combine together forming NaCl. In this reaction:

a. Na is oxidized
b. Cl is reduced
c. Na is reduced
d. sodium is oxidized and chlorine reduced

3. Which of the following elements is a metal ?

I. $^{23}_{11}\mathbf{X}$ II. $^{19}_{9}\mathbf{Y}$ III. $^{20}_{10}\mathbf{Z}$

a. I & II b. I & III c. III & II d. I

4. The following elements represent third period of the periodic table :

Na Mg Al Si P S Cl Ar

Which of these is Alkaline earth metal & Alkali metals respectively :

a. Al, Na b. Mg, P c. P, Si d. Mg, Na

5.

1							18
	2	13	14	15	16	17	
a	b		c			d	
							f

In the above diagram for the first three periods of the periodic table, elements are represented by the letters a, b, c, d and f. Which of the following statements is incorrect?

a. Element c belongs to halogen family
b. Element d contains 7 electrons in its octet.
c. Element a belongs to alkali metals
d. Element f belongs to noble family.

6. $Mg + CuSO_4 \longrightarrow MgSO_4 + Cu$
$Mg + FeSO_4 \longrightarrow MgSO_4 + Fe$
$Pb + CuSO_4 \longrightarrow PbSO_4 + Cu$
From the above three reactions, we can predict the reactivity:

a. Mg > Fe > Cu > Pb
b. Mg > Fe > Pb > Cu
c. Pb > Fe > Mg > Cu
d. Fe > Mg> Pb> Cu

7. Identify a double displacement reaction among the following:

a. $CuSO_4 + H_2S \longrightarrow CuS + H_2SO_4$
b. $Mg + H_2SO_4 \longrightarrow MgSO_4 + H_2$
c. $NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$
d. All of the above

8. When pentane, C_5H_{12} is burned in excess of oxygen, the products of the reaction are $CO_2(g)$ and $H_2O(l)$. The balanced equation for this combustion is:

$C_5H_{12}(g) + xO_2(g) \rightarrow 5CO_2(g) + 6H_2O(l)$

The coefficient (x) of oxygen should be:

a. 16 b. 12 c. 11 d. 8

9. Which among the following metals gives H_2 with hot dil. NaOH solution?

a. Iron b. Aluminium c. Copper d. Silver

10. Which among the following will be most acidic?

a. A solution with pH value of 6.0
b. A solution with pH value of 5.0
c. A solution with pH value of 3.0
d. A solution with pH value of 10.0

11. Which among the following is an Acid salt?

a. NaCl b. Na_2CO_3 c. $Ca(HSO_4)_2$ d. $NaNO_3$

12. Which of the following is a weak acid?

a. HNO_3 b. HCl c. H_2SO_4 d. Oxalic Acid

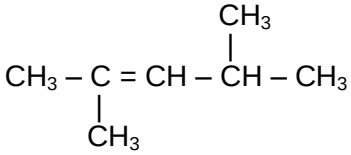
13. A compound (X) on heating releases a gas (which causes cakes to rise and makes them soft and spongy) and another compound (Z), which on recrystallisation forms a compound (Y). The compound X, Y are:

a. Na_2CO_3, $NaHCO_3$
b. $NaHCO_3$, $Na_2CO_3 . 10H_2O$
c. $NaHCO_3$, $Na_2CO_3 . 6H_2O$
d. Na_2CO_3, CO_2

14. Which among the following cannot be the isomer of pentane.

a. n-pentane
b. 2-methyl butane
c. 2, 2-dimethyl propane
d. 2, 3-dimethyl butane

15. What will be the IUPAC name of following compound:



a. 2, 4 – Dimethyl pentane
b. 2 – Methyl hex – 2-ene
c. 2, 4 – Dimethyl pent-2-ene
d. 2, 4-Dimethyl pent-3-ene

16. Which of the following gas contains the same no. of molecules as 16 g of O_2? (At. Mass O = 16, S = 32)

a. 16 g O_3 b. 16 g SO_2 c. 32 g SO_2 d. all of these

17. The weight of a single atom of oxygen is:

a. 0.057×10^{23} g
b. 2.657×10^{-23} g
c. 2.657×10^{23} g
d. 4.657×10^{-23} g

18. When excess of CO_2 is passed through lime water :

a. it becomes clear due to the formation of soluble $CaCO_3$
b. it becomes clear due to the formation of soluble $Ca(HCO_3)_2$
c. it becomes milky due to the formation of insoluble $CaCO_3$
d. it becomes milky due to the formation of insoluble $Ca(HCO_3)_2$

19. Out of Zn, Al, Cu and Fe, least reactive is:

a. Cu b. Zn c. Al d. Fe

20. On the basis of sequence of reactions, identify the most and least reactive elements:

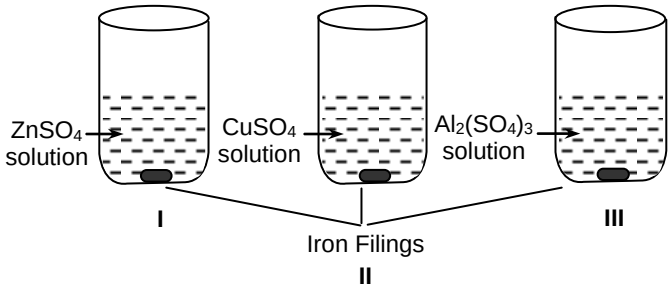
$A + BX \longrightarrow AX + B$ …(i)
$C + AY \longrightarrow CY + A$ …(ii)

a. A, C b. B, C c. C, A d. C, B

21. On burning magnesium ribbon in air it is observed that

a. a greenish gas is obtained
b. it burns brightly, giving out a golden colour
c. it burns brightly, leaving a blue ash
d. it burns brightly, leaving behind a white powder

22. The following three sets of equipment were arranged and observations made after one hour. A coating on iron filings was observed in:



a. I and II b. II only c. III only d. II and III

23. Acetic acid was added to a solid X kept in a test tube. A colourless, odourless gas Y was evolved. The gas was passed through lime water, which turned milky. It was concluded that:

a. solid X is sodium hydroxide & the gas Y is CO_2
b. solid X is sodium bicarbonate & the gas Y is CO_2
c. solid X is sodium acetate & the gas Y is CO_2
d. solid X is sodium bicarbonate and the gas Y is SO_2

24. If a compound has empirical formula mass 142 and molecular formula mass 284. What will be molecular formula if it has empirical formula M_2O_5:

a. M_4O_{10} b. M_2O_5 c. M_8O_{20} d. MO_3

25. Which of the following metal oxide is most basic?

a. ZnO b. CaO c. Na_2O d. MgO

26. Which among the following reaction is not an oxidation – Reduction reaction?

a. $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$
b. $Fe(s) + 4H_2O(g) \longrightarrow Fe_3O_4(s) + H_2(g)$
c. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$
d. $AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$

27. How many hydrogen molecules will be required for complete saturation of compound of formula C_4H_6:

a. 1 b. 2 c. 3 d. zero

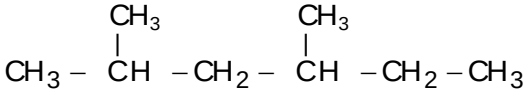
28. A compound consists of 47.8% A and 52.2% B by mass. The empirical formula is A_xB_y where x and y can have the values:(If At wt. of A = 65.3, B = 35.5]

a. 1 and 1 b. 1 and 2 c. 2 and 1 d. 2 & 3 respectively

29. The element with the largest size in the 2nd period is:

a. lithium b. fluorine c. sodium d. oxygen

30. What is the correct IUPAC name of the following compound



a. 1,1,4-Trimethylpentane
b. 3,5-Dimethylhexane
c. 2,4-Dimethylhexane
d. None

31. Which of the following elements has 8 electrons in 2nd and 3rd shell

a. Na b. F c. Ne d. K

32. Which is not correctly matched

	Functional Group	Name		Functional Group	Name
a.	R – CH_2OH	Alcohol	b.	RCOOH	Acid
c.	R – O – R	Ketone	d.	RCOOR	Ester

33. Which of the following match is correct.

a. A basic oxide which is soluble in water — NO_2
b. An acidic oxide which is soluble in water — CO_2
c. A hydroxide which is soluble in water — $Al(OH)_3$
d. A hydroxide which is insoluble in water — NaOH

34. An element 'A' on reacting with oxygen forms an oxide AO_2. This oxide on dissolving in water turns Red litmus to Blue. Which of the following is not True for element 'A'.

a. Element 'A' is good conductor of electricity
b. Element 'A' act as a reducing agent
c. conductance of 'A' increases with increase in temperature
d. All are true statements for 'A'.

35. The atomic radius decreases as we move across a period because

a. atomic mass increases
b. atomic number increases
c. effective nuclear charge increases
d. additive electrons are accommodated in the new electron level

36. How many litres of oxygen at STP will be required to completely burn 8 lit Ethene to CO_2 and H_2O

a. 8 lit. b. 20 lit. c. 24 lit. d. 30 lit.

37. Which of the following compound will have maximum percentage of nitrogen by mass. (At. Mass N = 14; O = 16]

a. NO b. HNO_3 c. N_2O_4 d. NH_4NO_3

38. Which of the following is Tribasic acid:

a. H_3PO_4 b. H_2SO_4 c. $Ca(OH)_2$ d. $Al(OH)_3$

39. Which of the following has the highest mass?

a. 20 g phosphorous
b. 12×10^{24} atoms of hydrogen
c. 5 moles of water
d. 200 mg of CO_2

40. Which of the following has Basicity three

a. H_3PO_4 b. H_3PO_2 c. $Al(OH)_3$ d. $B(OH)_3$

41. The metal which cannot displace hydrogen from acid is

a. sodium b. calcium c. copper d. Magnesium

42. The general formula of alkynes is :

a. $C_n H_{2n+2}$ b. $C_n H_{2n-1}$ c. $C_n H_{2n-2}$ d. $C_n H_{2n}$

43. A concentrated solution of lead nitrate in water can be stored in

a. an iron vessel
b. a copper vessel
c. a zinc vessel
d. a magnesium vessel

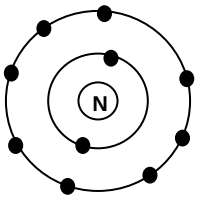
44. On heating lead nitrate, brown fumes of 'X' gas is evolved. What is the percentage of nitrogen in the gas 'X'?

a. 46.62% b. 30.43% c. 60.34% d. Zero

45. Which of the following is not an alkali metal.

a. Li b. Cs c. Sr d. Rb

46. An element with following electronic configuration is



This element belongs to

a. Alkali metal b. Halogen family c. Oxygen family d. Noble gas

47. Which IUPAC name is correctly matched?

	IUPAC Name
a. $CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-C\equiv C-CH_3$	2-Methylpent-3-yne
b. $CH_3-\underset{\displaystyle CH_2CH_3}{\underset{\vert}{CH}}-C\equiv C-CH_3$	4-Ethylpent-2-yne
c. $CH_3-CH_2-\underset{\displaystyle OH}{\underset{\vert}{CH}}-CH_2-CH_3$	Butan-3-ol
d. $CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_2-COOH$	3-Methylbutanoic acid

48. In the compound XY_4, X shares electron with each of the Y atom. Which of the following statement regarding the compound is correct:

a. Nature of bonding in XY_4 is ionic
b. It has high melting & boiling point
c. Compound will be covalent
d. Compound will be unsaturated covalent

49. The chemical test given by ethanoic acid is

a. Sodium metal test
b. Sodium bicarbonate test
c. Saponification test
d. All the above

50. Which of the following oxide is most acidic.

a. CO_2 b. NO_2 c. SO_3 d. Cl_2O_7

51. Which element has a total of two shells with three electrons in its valence shell?

a. Lithium b. Boron c. Helium d. Aluminium

52. Given below are the observations reported by four students I, II, III and IV for the changes observed with diluted HCl or diluted NaOH and different materials.

Materials	Dil. HCl	Dil. NaOH
I. Moist litmus paper	Blue to red	Red to blue
II. Zinc metal	React at room temperature	Does not react at temperature
III. Zinc metal on heating	Liquid becomes milky	Remains clear and transparent
IV. Solid sodium bicarbonate	No reaction	Brisk effervescence

The incorrectly reported observation is:

a. I b. II c. III d. IV

53. A hydrocarbon of molecular mass 142 is

a. An Alkane b. An alkene c. An alkyne d. none

54. Vapour density (VD) and molecular weight (MW) have the relationship as

a. MW = $\frac{1}{2}$VD b. MW = $\frac{1}{4}$VD c. MW = 2VD d. MW = 4VD

55. Which of the following statements is incorrect statement about the trends going from left to right across the periodic table.

a. Elements become less metallic in nature
b. The number of valence electrons increases
c. The atoms lose their electrons more easily
d. The oxide become more acidic

56. Which of the following metal does not react with cold water to displace H_2

a. K b. Ca c. Ba d. Zn

57. How many structural isomeric alkene are possible for C_4H_8

a. 4 b. 3 c. 5 d. 6

58. A non-polar compound having polar bond is

a. Hydrogen gas b. Ammonia c. Water d. Methane

59. Octet rule is not obeyed by

a. Carbondioxide b. Boron fluoride (BF_3) c. Ethanol d. Cesium fluoride

Based on diagram below, answer the following questions (Q 60 to 62)

1							18
A	2	13	14	15	16	17	K
B			E		I	G	
C				F			H
D				J			

The above diagram represents the first four period of the periodic table, Elements are not represented here by their usual symbol but instead by letters, A, B, C, D, E, F, G, H, I, J, K etc.

60. The correct formula of oxalate of element D will be

a. $D_2(C_2O_4)_3$ b. $D_3(C_2O_4)_2$ c. $D(C_2O_4)_2$ d. $D_2(C_2O_4)$

61. Arrange the following in order of their decreasing atomic radii. I^{-2}, G^-, C^+

a. $G^- > C^+ > I^{-2}$ b. $I^{-2} > G^- > C^+$ c. $C^+ > I^{-2} > G^-$ b. $G^- > I^{-2} > C^+$

62. Identify the element among the following which has zero electron affinity.

a. A b. G c. E d. H

PHYSICS

63. The note "Saa" on the Sarod and the Sitar have the same pitch. The property of a sound that is most important in distinguishing between the two instruments is

a. fundamental frequency
b. displacement amplitude
c. intensity
d. waveform

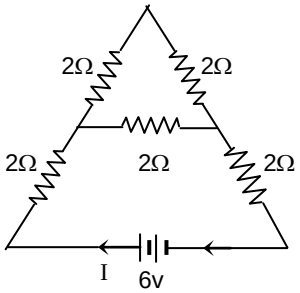
64. The main cause of refraction of light is:

a. change in frequency
b. change in speed of light while passing from one medium to another medium
c. rectilinear propagation of light
d. All of the above

65. The coin appears slightly raised above its actual position when placed into the bowl. It is due to:

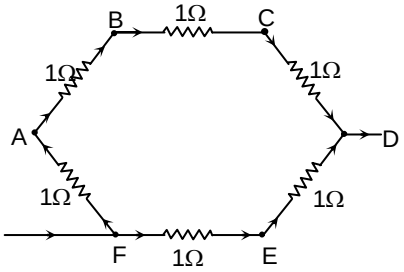
a. phenomenon of reflection of light
b. phenomenon of refraction of light
c. phenomenon of scattering
d. phenomenon of total internal reflection of light

66. What is the current (I) in the circuit?



a. 4.5 A b. 6 A c. 1.125 A d. 7 A

67. Six equal resistors of 1Ω each are joined to form a regular hexagon ABCDEF. Calculate the resistance offered by the combination if current enters at F and leaves at D.



a. 6Ω b. 4Ω c. 2Ω d. 1.33 Ω

68. Small quantity of current is expressed in milli ampere. 1 mA is equivalent to _____.

a. 10^{-6} A b. 10^{-2} A c. 10^{-3} A d. 10^{-4} A

69. A 16 Ω resistance wire is doubled in thickness, without change in length. The new resistance of the wire will be:

a. 1 Ω b. 2 Ω c. 8 Ω d. 4 Ω

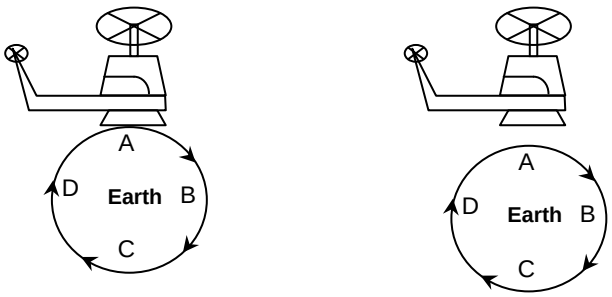
70. The strength of uniform magnetic field around a current carrying solenoid does not depend upon:

a. No. of turns per unit length of solenoid
b. The current passing through solenoid
c. radius of the circular coil
d. Both (a) and (b)

71. Which among the following statement is incorrect?

a. Sky appears dark to passenger flying at very high altitude as scattering is not prominent at such heights.
b. Red light has higher wavelength than blue light, so dust particles in air will scatter red light more strongly than blue.
c. Danger signal lights are red in colour because of more wavelength of red light.
d. Scattering of light causes blue colour of sky & reddning of sun at sun rise & sun set

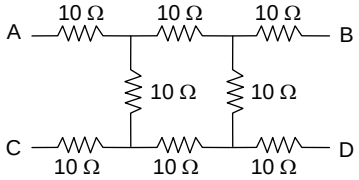
72.



A helicopter is stationed on a helipad at point (A) the equator on earth, which is rotating about its axis completing its circle with a time period of 24 hours. The pilot decides to pull the lever so as to lift it up at 500 mtr altitude. Considering he doesn't give any forward or backward command to the helicopter, in how much time will it reach exactly the opposite side of the earth at point C.

a. 12 hrs b. 24 hours c. Never d. None of these

73. What will be the equivalent resistance of circuit shown in figure between points *A* and *D*

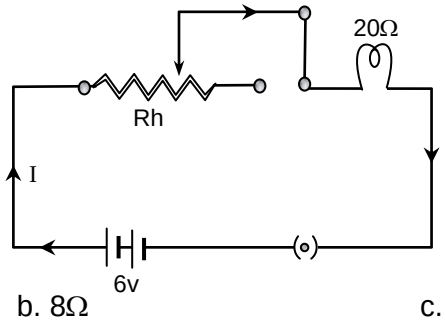


a. 10 Ω b. 20 Ω c. 30 Ω d. none

74. In which of the following medium, velocity of light is maximum?

a. Diamond b. Benzene c. Water d. Air

75. Suppose a 6-volt battery is connected across a lamp whose resistance is 20 Ω through a variable resistor as shown in Figure. If the current in the circuit is 0.25 A, calculate the value of the resistance from the resistor which must be used?

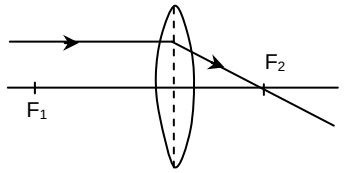


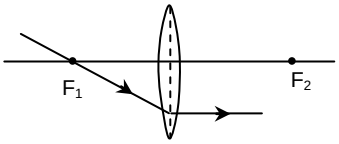
a. 12Ω b. 8Ω c. 4Ω d. 2Ω

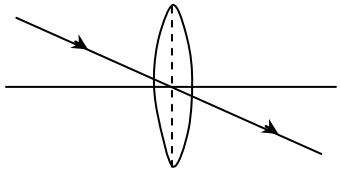
76. A wire of uniform cross section having 3 Ω resistance & 10 cm length is stretched to 30 cm length. What will be its new resistance?

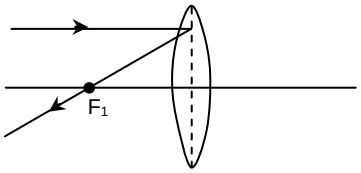
a. 3 Ω b. 30 Ω c. 27 Ω d. 18 Ω

77. Which of the following ray diagrams is incorrect:

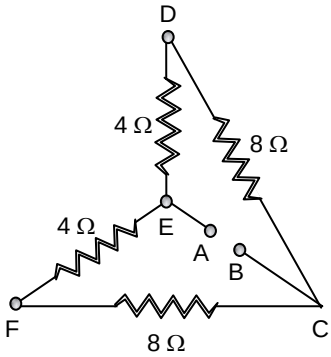
a.


b.


c.


d.


78. Calculate the equivalent resistance of the network across the points A and B shown in Figure.

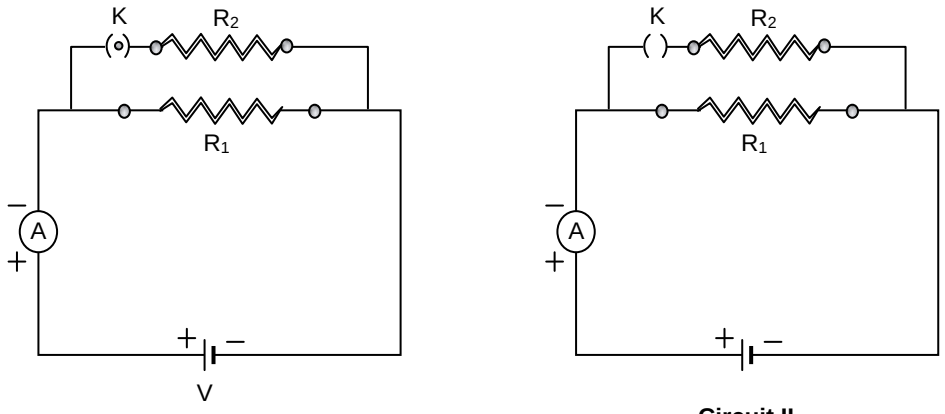


a. 6Ω b. 10Ω c. 12Ω d. 16Ω

79. A convex lens forms a real & inverted image of a needle at a distance of 50 cm from it. If the needle is placed in front of the convex lens so the image is equal to size of the object. What is the power of lens (dioptre).

a. 4 dioptre b. 6 dioptre c. 8 dioptre d. 10 dioptre

80. Two electric circuits I and II are shown in Fig. In circuit I, the key K is closed whereas in circuit II, the key is open. Which of the following statement is incorrect.



Circuit I **Circuit II**

a. Current in circuit I is more than the current in circuit II
b. In circuit I, since K is closed R_1 & R_2 are in parallel combination Their equivalent resistance is given by = $\frac{R_1R_2}{R_1+R_2}$
c. In circuit II, since K is open, the resistance R_2 is out of circuit & as such the net resistance in the circuit is R_1
d. Current in I is less than the current in II

SAMPLE PAPER - 1 (ANSWER KEY)

1. B 2. D 3. D 4. D 5. A 6. B 7. A 8. D 9. B 10. C 11. C 12. D

13. B 14. D 15. C 16. C 17. B 18. B 19. A 20. D 21. D 22. B 23. B 24. A

25. C 26. D 27. B 28. B 29. A 30. C 31. D 32. C 33. B 34. C 35. C

36. C

Sol. C_2H_4 + $3O_2$ $\longrightarrow$ $2CO_2$ + $2H_2O$

1 lit. 3 lit.

8 lit. 8 × 3 = 24 lit.

37. A

Sol. $\underset{(NO)}{\%\ N} = \frac{14}{30}\times 100 = \frac{140}{3} = 46.6$ $\underset{(HNO_3)}{\%\ N} = \frac{14}{63}\times 100 = 22.2$

$\underset{(N_2O_4)}{\%N} = \frac{28}{92}\times 100 = 30\%$ $\underset{(NH_4NO_3)}{\%N} = \frac{28}{80}\times 100 = 35\%$

38. A 39. C 40. A 41. C 42. C 43. B 44. B 45. C 46. D 47. D 48. C 49. D

50. D 51. B 52. D

53. A

Sol. $C_nH_{2n+2} = 142$ i.e. $12n + 2n + 2 = 142$; $n = 10$

54. C 55. C 56. D

57. B

Sol. 3 $CH_3 - CH_2 - CH = CH_2$; $CH_3 - CH = CH - CH_3$, $CH_2 = \underset{\displaystyle CH_3}{\overset{|}{C}} - CH_3$

58. D 59. B 60. D 61. B 62. D 63. D 64. B 65. B 66. C 67. D 68. C 69. D

70. C 71. B 72. C 73. C

74. D

Sol. Refractive index of air is minimum, so velocity will be maximum

75. C

Sol. Here, supply voltage, V = 6 volt

resistance of the lamp, r = 20 Ω

current in the circuit, I = 0.25 A

Let R_1 be the resistance required from the variable resistance (a rheostat, Rh) to be placed in series with the lamp.

Total resistance in the circuit, $R = R_1 + r = R_1 + 20$

Applying Ohm's law, $I = \frac{V}{R}$

or $0.25 = \frac{6}{R_1 + 20}$ or $R_1 + 20 = \frac{6}{0.25} = 24$ or $R_1 = \mathbf{4\ \Omega}$

76. C

Sol. When the length of the wire becomes three time its area of cross section is reduced from A to A/3

Therefore new resistance = $\rho\frac{3\ell}{A/3}$

$= 9\frac{\rho\ell}{A}$

$= 9 \times R$

$= 9 \times 3 = 27\ \Omega$

77. D **78. A**

79. A

Sol. Here, the image distance, $\upsilon = 50$ cm

object distance, u = ?

power of lens, P = ?

As the image is of the same size as the object, therefore, object must be at a distance equal to twice the focal length of the lens. In this case,

$- u = \upsilon = 2f = 50$ cm.

$\therefore$ $u = -50$ cm and $f = 25$ cm.

As $P = \frac{100}{f\ (cm)}$ $\therefore$ $P = \frac{100}{25} = 4$ dioptre

80. D