CHEMISTRY

1. **Calculate to the proper number of significant figures: 58.0 + 0.0035 + 0.00002**

   A) 58.00352 **B)** 58.0035

   C) 58 **D)** 58.0

2. **Find the sum to the proper number of significant figures:**

   12.90 + 0.0068 + 0.082 + 1.1

   A) 14.0888 **B)** 14

   C) 14.0 **D)** 14.1

3. **Express the following into scientific notation in three significant digits: 0.003006**

   A) 3.006×10^{-3} **B)** 3.00×10^{-3}

   C) 3.01×10^{-3} **D)** 3.0×10^{-3}

4. **Calculate the correct number of significant figures: 4.26 – (15.635/5.0)**

   A) 1.13 **B)** 1.2

   C) 1.1 **D)** 1.133

5. **If X = $(1.20 \times 10^{-6}) + (6.0 \times 10^{-5})$, then the value of X to the correct number of significant figure is**

   A) 6.12×10^{-5} **B)** 7.20×10^{-5}

   C) 6.1×10^{-5} **D)** 6.1×10^{-6}

6. **Candela is S.I unit of**

   A) Electric current **B)** Energy

   C) Luminous intensity **D)** Stress

7. **The S.I unit of pressure is**

   A) Torr **B)** Atmosphere

   C) Pascal **D)** Dynes per square metre

8. **The correctly reported difference of 23.3496 and 4.02 will have significant figures equal to**

   A) Three **B)** Four

   C) Five **D)** six

9. **The multiple 10^{12} has the prefix**

   A) Peta **B)** Pico

   C) Giga **D)** Tera

10. **N Kg^{-1} is the unit of**

    A) Momentum **B)** Velocity

    C) Pressure **D)** Accelaration

11. **The human eye is more sensitive to light whose wavelength is 555 nm(greenish yellow). Find out the wavelength in millimetre.**

    A) 5.55×10^{4} **B)** 5.55×10^{-4}

    C) 5.55×10^{-6} **D)** 5.55×10^{2}

12. **The oxygen molecule consists of two oxygen atoms at a distance of 121 pm apart. How many millimetre is this distance ?**

    A) 1.21×10^{-9} **B)** 1.21×10^{-7}

    C) 1.21×10^{4} **D)** 1.12×10^{-7}

13. **$NaHCO_3$, known as commercially baking soda, reacts with acidic materials such as vinegar to release CO_2 gas. An experiment calls for 0.348 kg of $NaHCO_3$. Express this mass in mg.**

    A) 3.4×10^{4} **B)** 3.4×10^{5}

    C) 3.4×10^{3} **D)** 3.4×10^{1}

14. **Find out the distance between Earth and Sun in km, which is 93 million miles.**

    A) 1.496×10^{8} **B)** 1.496×10^{6}

    C) 1.4×10^{4} **D)** 1.4×10^{5}

15. **Express decimal equivalent of 1/60 to three significant figures.**

    A) 0.0167 **B)** 0.01666

    C) 0.0166 **D)** 1.7×10^{2}

16. **(3.50×10^{2} mL) – (0.0225 L) may be written to correct significant digits.**

    A) 3.28×10^{2}mL **B)** 0.3275 L

    C) 3.275×10^{2}mL **D)** 0.33 L

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

17. **The correct number of signifficant figures in the answer of 0.00383 – 0.00303 is**

A) Two **B)** Five
C) One **D)** Four

18. **The mass of a piece of paper is 0.02 g and the mass of a solid substance X and the piece of paper is 20.036 g. If the volume of solid is 2.16 cm^3,calaulate its density to the proper number of significant digits.**

A) 9.27 g cm^{-3} **B)** 9.3 g cm^{-3}
C) 9.267 g cm^{-3} **D)** 43.24 g cm^{-3}

19. **81.4 g sample of ethyl alcohol contains 0.002 g of water. The amount of pure ethyl alcohol (to proper number of significant figures) is**

A) 81.398 g **B)** 81.40 g
C) 81.4 g **D)** 81 g

20. **5 cubic metre in cubic centimetre is equal to**

A) 5×10^{-3} **B)** 5×10^{3}
C) 5×10^{9} **D)** 5×10^{6}

21. **Which curve does not represent Boyle's law?**

A) P vs V **B)** log P vs log V
C) P vs 1/V **D)** P vs V

22. **The average speed of an ideal gas molecule at 27^0C is 0.3 m/sec.The average speed at 927^0C will be**

A) 0.6 m/sec **B)** 0.3 m/sec
C) 0.9 m/sec **D)** 3.0 m/sec

23. **The root mean square speed of hydrogen molecules at room temperature is 2400 ms^{-1}. At room temperature the root mean square speed of oxygen molecules would be**

A) 400 ms^{-1} **B)** 300 ms^{-1}
C) 600 ms^{-1} **D)** 1600 ms^{-1}

24. **One litre of a gas collected at NTP will occupy at 2 atmospheric pressure and 27^0C**

A) $\frac{300}{2\times273}$ litres **B)** $\frac{2\times300}{273}$ litres
C) $\frac{273}{2\times300}$ litres **D)** $\frac{2\times273}{300}$ litres

25. **Oxygen and nitrogen are filled in a vessel in the ratio of 1:4 by weight.Therfore,the ratio of number of molecules is**

A) 3:4 **B)** 7:8
C) 7:16 **D)** 7:32

26. **32 g of oxygen and 3 g of hydrogen are mixed and kept in a vessel of 760 mm pressure and 0^0C. The total volume occupied by the mixture will be nearly**

A) 22.4 litres **B)** 33.6 litres
C) 56 litres **D)** 44.8 litres

27. **In van der Waals equation of state for a non-ideal gas, the term that accounts for inter-molecular forces is**

A) $(p + a/V^2)$ **B)** (V–b)
C) RT **D)** I/RT

28. **The density of neon will be highest at**

A) S.T.P **B)** 0^0C, 2atm
C) 273^0C,1atm **D)** 273^0C, 2atm

29. **A gas with a volume of 20 cm^3 at p atmosphere expands to 50 cm^3 at constant T. The final pressure of the gas will be**

A) $\frac{50\times P}{20}$ atm **B)** $\frac{20\times P}{20}$ atm
C) $\frac{50\times 20}{P}$ atm **D)** $\frac{P}{50\times 20}$ atm

30. **The r.m.s speed of gas molecules at a temperature 27 K and pressure are raised three times, the r.m.s speed of the gas will be**

A) 9 × 104 cm/sec **B)** 3 × 104 cm/sec
C) 1 × 104 cm/sec **D)** ≈1 × 104 cm/sec

17. (A) 18. (A) 19. (C) 20. (D) 21. (D) 22. (A) 23. (C) 24. (A) 25. (D) 26. (C)
27. (A) 28. (B) 29. (B) 30. (D)

31. **The relative ratio of $m_{rms} : m_{av} : m_{mp}$ at a given temperature is**

A) $m_{rms} > m_{av} > m_{mp}$

B) $m_{rms} < m_{av} < m_{mp}$

C) $m_{rms} > m_{av} < m_{mp}$

D) $m_{rms} < m_{av} > m_{mp}$

32. **The rate of diffusion of methane at a given temperature is that of a gas X. The molecular weight of X is**

A) 64.0 **B)** 32.0

C) 4.0 **D)** 8.0

33. **The average speed of an ideal gas molecules at 27^0C is 0.3 ms^{-1}. The average speed at 927^0C will be**

A) 0.6 ms^{-1} **B)** 0.3 ms^{-1}

C) 0.9 ms^{-1} **D)** 3.0 ms^{-1}

34. **The gram molar volume of a gas is the volume occupied at STP by**

A) One gram of the gas

B) 6.023×10^{23} grams of the gas

C) 22.4 g of gas

D) One gram mole of the gas

35. **How many moles of an ideal gas will occupy 8.2L at 10 atm pressure and 127^0C ?**

A) 5.0 mol **B)** 1.25 mol

C) 2.5 mol **D)** 4.6 mol

36. **A gas diffuses 1/5 times as fast as hydrogen. Its molar mass is**

A) 25 **B)** 50

C) $25\sqrt{2}$ **D)** $50\sqrt{2}$

37. **The values of van der Waals constant 'a' for the gases O_2, N_2, NH_3 and CH_4 are 1.360, 1.390, 4.170 and 2.52 L2 atm mol^{-2} respectively. The gas which can most easily be liquified is**

A) O_2 **B)** N_2

C) NH_3 **D)** CH_4

38. **The r.m.s velocity of hydrogen is $\sqrt{7}$ times the r.m.s velocity of nitrogen. If T is the temperature of the gas**

A) $T(H_2)=T(N_2)$ **B)** $T(H_2)>T(N_2)$

C) $T(H_2)<T(N_2)$ **D)** $T(H_2)=\sqrt{7}\,T(N_2)$

39. **Calculate the pressure of 6 g of hydrogen at 273^0C and occupying volume of 89.5 dm^3**

A) 150917.15Pa **B)** 157198.05Pa

C) 151987.5Pa **D)** 658423.65Pa

40. **The mass of 350ml of diatomic gas at 273K and $2 \times 101325 Nm^{-2}$ pressure is 1g. Calculate the mass of one atom of it.**

[$P_1V_1=P_0V_0$ to evaluate V_0 (at STP)]

A) 2.656×10^{-23}g **B)** 23.61×10^{-29}g

C) 98.07×10^{-11}g **D)** 6.8723×10^{-65}g

41. **Calculate the de Broglie wavelength of an electron that has been accelerated from rest through a potential difference of 1 kV.**

A) 1.87×10^{-11}m

B) 3.87×10^{-11}m

C) 32.87×10^{-11}m

D) 13.87×10^{-10}m

42. **Calculate the wavelength associated with an electron moving with a velocity of 1000 m/s.**

A) 7.25×10^{-7}m **B)** 4.84×10^{-11}m

C) 4.87×10^{-10}m **D)** 3.07×10^{-16}m

43. **A moving electron has 4.55×10^{-25} joules of kinetic energy. Calculate its wavelength.**

A) 4.23×10^{-10}m **B)** 7.25×10^{-7}m

C) 2.07×10^{-5}m **D)** 3.37×10^{-13}m

44. **What is the mass of photon of sodium light with a wavelength of 5890Å?**

A) 2.7×10^{-32} kg **B)** 3.75×10^{-36} kg

C) 2.17×10^{-30} kg **D)** 2.4×10^{-32} kg

45. **What will be the wavelength of oxygen molecule in picometres moving with a velocity of 660 m/s?**

A) 17 pm **B)** 27 pm

C) 18.8 pm **D)** 10pm

31. (A) 32. (A) 33. (A) 34. (D) 35. (C) 36. (B) 37. (C) 38. (A) 39. (C) 40. (A)
41. (B) 42. (A) 43. (B) 44. (B) 45. (C)

46. The moving electron has 4.9×10^{-25} joules of kinetic energy. Find out its de Broglie wavelength.

A) 3×10^{-3} m **B)** 3×10^{-2} m

C) 4×10^{-4} m **D)** 7×10^{-7} m

47. The kinetic energy of sub-atomic particle is 5.85×10^{-25} joules. Calculate the frequency of the particle wave.

A) $1.77 \times 10^{3}\ s^{-1}$ **B)** $1.77 \times 10^{9}\ s^{-1}$

C) $1.177 \times 10^{4}\ s^{-1}$ **D)** $1.747 \times 10^{3}\ s^{-1}$

48. Two particles A and B are in motion. If the wavelength associated with the particle A is 5×10^{8} m, calculate the wavelength of particle B, if its momentum is half of A.

A) 10^{-7} m **B)** 10^{-8} m

C) 10^{-10} m **D)** 10^{-9} m

49. Find the de Broglie wavelength of electrons moving with a kinetic energy of 100 eV.

A) 1.5×10^{-10} m **B)** 1.4×10^{-10} m

C) 1.2×10^{-10} m **D)** None

50. Find the de Broglie wavelength of electrons accelerated through a potential difference of 100 volts.

A) 1.32Å **B)** 1.25Å

C) 1.23Å **D)** 1.02Å

51. Wave function in quantum mechanics represents

A) A state of the system

B) Shape of the system

C) Probability of the system

D) Energy of the system

52. Which of the following is incorrect about the de Broglie relationship ?

A) $h = \lambda \times p$ **B)** $h/v = \lambda \times p$

C) $E_{kinetic} = hv/2\lambda$ **D)** $E_{kinetic} = 2hv/\lambda$

53. Out of X-rays, Infra red rays, visible rays and micro waves, the largest frequency is of

A) X-rays **B)** Infra red rays

C) Visible rays **D)** Micro waves

54. The correct Schrodinger wave equation for an electron in a potential field V in three dimension is

A) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{h^2}(E-V)\psi = 0$

B) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{nh}(E-V)\psi = 0$

C) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^3}+\frac{8\pi^2}{mh}(E-V)\psi = 0$

D) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{h^2}(E+V)\psi = 0$

55. Which of the following electron transition in a hydrogen atom will require the largest amount of energy ?

A) From n=1 to n=2

B) From n=1 to n=3

C) From n=∞ to n=1

D) From n=3 to n=5

56. A photon of wavelength 4000 Å strikes a metal surface, the work function of the metal being 2.13 eV. The kinetic energy of the emitted photoelectron is

A) 0.97 eV **B)** 9.7 eV

C) 5.23 eV **D)** 3.10 eV

57. The uncertainity in the energy of the excited state for an atom with a mean life of 10^{-8} sec

A) 10^{-16} erg **B)** 2×10^{-19} erg

C) 6.6×10^{-19} erg **D)** 10^{-19} erg

58. The Schrodinger wave equation for hydrogen atom can be expressed as

A) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{h^2}\left(E-V+\frac{1}{mv^2}\right)\psi = 0$

B) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{h^2}{8\pi^2 m}\left(E+\frac{Ze^2}{r}\right)\psi = 0$

C) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{h^2}\left(E+\frac{Ze^2}{r}\right)\psi = 0$

D) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}+\frac{8\pi^2 m}{h^2}\left(E+\frac{4\pi^2 m^2 v^2}{v}\right)\psi = 0$

46. (D) 47. (B) 48. (A) 49. (C) 50. (C) 51. (A) 52. (D) 53. (A) 54. (A) 55. (A)
56. (A) 57. (D) 58. (C)

59. The electronic configuration of the atom with atomic number 47 is

A) [Kr] $4d^{10}\,5s^2$ **B)** [Ar] $4d^{10}\,5s^1$

C) [Kr] $4d^{10}\,5s^1\,5d^1$ **D)** [Kr] $4d^{10}\,5s^1$

60. De Broglie wavelength of a body of mass 1000 moving with a velocity of 3000 metre per second is

A) 2.208×10^{-31} m **B)** 2.208×10^{-40} m

C) 2.208×10^{-37} m **D)** 220.8×10^{-37} m

61. For dilute solutions, Raoult's law states that

A) The relative lowering of vapour pressure is equal to mole fraction of solute

B) The relative lowering of vapour pressure is equal to mole fraction of solvent

C) The relative lowering of vapour pressure is propotional to the amount of the solute in solution

D) The vapour pressure of the solution is equal to mole fraction of solvent

62. Pressure cooker reduces cooking time because

A) The heat is more evenly distributed inside the cooker

B) A large flame is used

C) Boiling point of the water is elevated

D) whole water is converted into steam

63. Which one 0.1 M aqueous solution will have the lowest freezing point?

A) K_2SO_4 **B)** NaCl

C) Urea **D)** glucose

64. The osmotic pressure of a dilute solution is directly propotional to the

A) Diffusion rate of the solute

B) Concentration of the solute

C) Elevation of boiling point

D) Flow of solvent from a concentrated solution to a dilute solution

65. Different solutions prepared by dissolving one mole of urea, 1/3rd mole of glucose and 1/2 mole of NaCl in 1 litre water. Equal O.P will be produced by

A) Urea and glucose

B) Urea and NaCl

C) Glucose and NaCl

D) Glucose, Urea and NaCl

66. The colligative properties of a solution are

A) a molality

B) $\propto 1/m$

C) Propotional to each other

D) None of these

67. Which solution will have the lowest freezing point ?

A) 1% solution of glucose in water

B) 1% solution of sodium chloride in water

C) 1% solution of zinc sulphate in water

D) 1% solution of urea in water

68. The osmotic pressure of a decimolar solution of glucose at 30^0C is

A) 24.88 atm

B) 2.488 atm

C) 0.248 atm

D) 189.09 atm

69. Which has the highest boiling point?

A) 0.5 M $CaCl_2$

B) 1.0 M HBr

C) 100 g powdered glass in 1 litre H_2O

D) 1.8×10^{24} glucose molecule per litre

70. Which has minimum freezing point?

A) 0.005 M HCl

B) 0.005 M C_2H_5OH

C) 0.005 M $MgSO_4$

D) 0.01 M $MgSO_4$

59. (D) 60. (C) 61. (A) 62. (C) 63. (A) 64. (B) 65. (B) 66. (D) 67. (B) 68. (B) 69. (D) 70. (D)