Solution

SOME BASIC CONCEPTS OF CHEMISTRY WS 1

Class 11 - Chemistry

Section A

1. **(d)** Explaining superconductivity
   Explanation: Chemistry does not deal with explaining superconductivity.
   *In superconducting materials the characteristics of superconductivity appear when the temperature is lowered below a critical temperature.
   *The onset of superconductivity is accompanied by abrupt changes in physical properties which are more related to phase transitions of the material.
   These aspects of studies in properties of materials are better related to studies in the fields of Physics, even though principles involved in Chemistry & Physics go hand to hand.
2. **(a)** Medicinal chemistry
   Explanation: Medicinal chemistry
3. **(a)** analytical
   Explanation: analytical
4. **(c)** completely mixed with each other and its composition is uniform throughout.
   Explanation: In a homogeneous mixture,
   i. the components are mixed together completely.
   ii. has a uniform composition throughout.
5. **(d)** Turpentine oil
   Explanation: Ozone is absorbed in turpentine oil due to its oxidizing property.
6. **(b)** mixtures or pure substances
   Explanation: At the macroscopic level, the matter is classified as a mixture or pure substances. A mixture contains two or more components (in any ratio) present in it, for example -- sugar solutions in water, tea, air, alloys like brass, bronze, etc. Pure substances (viz. copper, silver, gold, water, glucose, etc.) have a fixed composition. The constituents of pure substances can not be separated by simple physical methods.
7. **(b)** the components completely mix with each other and its composition is uniform throughout.
   Explanation: Its a basic criteria of a homogeneous mixture.
   i. The components get mixed up uniformly throughout the mixture.
   ii. Its individual parts are not easily identifiable.
   iii. It has same proportions of its components through out the sample.
8. **(d)** 40 °C
   Explanation: 104°**F** − 32) × 5/9 = 40°**C**
9. **(c)** 0.03 mL
   Explanation: Since, 1 microliter
   $= 1 \times 10^{-6}$ liters, & 1ml
   $= 1 \times 10^{-3}$
   ∴ 1 microliter

= 0.001 mL

∴ 30 microliters

= (0.001 × 30) mL

1 microliter = 0.03 milliliter

10.

(b) K = °C + 273.15

Explanation: The relation between the Kelvin scale & Celcius scale of temperatures is -

K = °C + 273.15

Such a relationship is based upon the experimental findings and subsequent conclusion of Charle's law.

The Kelvin scale is also termed as an "absolute scale of temperature."

It is interesting to note that temperature below 0^oC (ie. negative values) is possible in the Celcius scale but in Kelvin scale, the negative temperature is not possible.

11. **(a)** 93.3 °C

Explanation: 93.3, as

F= 9/5(degree C) + 32

200 = 9/5 (c) +32

(200 -32) × 5 / 9 = C

C = 93.3

12.

(c) K = °C + 273.15

Explanation: It is because of the experimentally observed results by Charles, inferred and stated as Charle's law - i.e. "At constant pressure the volume of a given mass of a gas increases or decreases by a constant fraction ($\frac{1}{273}$) of its volume at 0^oC for each degree rise or fall of temperature, respectively ". Further, as mathematically derived 'the hypothetical temperature (-273^oC) the volume of the gas becomes zero called an absolute scale or Kelvin scale (symbolised as K).

13.

(c) -40 °C

Explanation: Calculations:-

Since , °F

= [(°C × 9/5) + 32]

Substituting the given value of temperature in ^{o} F ,we get

-40^o F

= (^{o}C × 1.8)

∴ ^{o} C

= - (72 / 1.8)

= **-40^o C**

14. **(a)** Relative atomic mass

Explanation: Relative atomic mass

15.

(c) can be measured or observed without changing the identity or the composition of the substance.

Explanation: The physical properties of a substance are related to their composition/structure. Hence, changing its composition/structure effects upon its physical properties.

16.

(b) 0.03 g

Explanation: since 1000 mg = 1g

∴ 30 mg

= [(1/1000) × 30] g

= 0.03 g

17.

(d) 93.3° C

Explanation: The relation between Celsius scale and Fahrenheit scale is:

$$C = \frac{5}{9}\left({}^{0}F - 32\right) = \frac{5}{9}(200 - 32) = 93.3$$

Hence, correct answer is 93.3 ^{o}C.

18.

(b) 20,000 mm/s
Explanation: 20m/s = 20000 mm/s

19. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Mass spectrometer determines atomic weight accurately and since isotopes are different in atomic weight, hence they form separate bands.

20.

(d) A is false but R is true.
Explanation: A is false but R is true.

21. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Examples of isomorphous compounds are K_2SO_4, K_2CrO_4, K_2SeO_4, (valency of S, Cr, Se = 6) and $ZnSO_4 \cdot 7H_2O$, $MgSO_4 \cdot 7H_2O$ $FeSO_4 \cdot 7H_2O$ (valency of Zn, Mg, Fe = 2).

22. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Intensive properties like density, pressure, temperature etc. are independent of the size of the sample. Extensive properties like mass and volume etc. depend on the size of the sample.

23. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Any substance that contains only one kind of atom is known as an element. They can be broken down into simpler substances. Two or more elements combine together to form componds.

24.

(c) A is true but R is false.
Explanation: A is true but R is false.

25.

(d) A is false but R is true.
Explanation: A is false but R is true.

26.

(c) 2 m
Explanation: Since 1 m = 1000 mm.
or, 1 mm = $\frac{1}{1000}m$
$\therefore$2000 mm = [$\frac{1}{1000} \times 2000$] m = 2m

27. **(a)** A compound retains the physical properties of its constituent elements.
Explanation: The compound does not retain the physical properties of its constituent elements. As compound has unique properties than its parent atoms. For example: water is a nonflammable liquid and does not support combustion. It is composed of two elements: hydrogen, an extremely flammable gas, and oxygen, a gas that supports combustion.

28.

(d) Pure substances have fixed composition, whereas mixtures may contain the components in any ratio and their composition is variable.
Explanation: Pure substances have only one component, therefore the composition is fixed throughout whereas mixtures have variable composition accordingly they may be either homogeneous or heterogeneous.

29. **(a)** Pure substances have fixed composition.
Explanation: Pure substances have a fixed composition. These may be both (i.e. either elements or compounds). The law of constant composition holds good for such substances.

30. Chemistry is the branch of science which deals with the study of composition, structure, properties, nature of matter and changes produced in the constitution of matter.

31. Chemical principles are important in diverse areas such as weather patterns, functioning of brain, operation of a computer, chemical industries, manufacturing, fertilizers, alkalis, acids, salts, dyes, polymers, drugs, soaps, detergents, metals, alloys, contribute in a big way to national economy.
32. The components of a mixture can be separated by physical methods given below:
    1. Handpicking
    2. Filtrations
    3. Crystallization
    4. Simple distillation
    5. Fractional distillation
    6. Evaporation
    7. Sublimation.
    8. Chromatography etc
33. The law of Gay Lussac's not obeyed if any reactant or product is not a gas. This is because, if any reactant or product is a liquid or solid, the volume occupied by them is extremely small as compared to the gas and hence, the law is not obeyed.
34. **Matter:** "Matter" is a broad word that applies to anything which has mass and perceived or known to be occupying space (solid matter; gaseous matter; vegetable matter).
    Material: Material corresponds to the matter which has a specific use. "Material" usually means some definite kind, quality, or quantity of matter, especially as intended for use (cotton material, explosive materials, a house built of poor materials).
35.

S.No.	Property	Solids	Liquids	Gases
1.	**Volume**	Solid have definite volume	Definite for non volatile liquids	Gases do not have definite volume.
2.	**Shape**	Fixed shape only in crystal form	Liquids do not have a definite shape. They take the shape of the container in which they poured.	Gases do not have a definite shape. It is assumed that gas is present everywhere in the given container.

36.

Pure Substances	Mixtures
Glucose (Compound)	Air
Gold (Element)	Milk
Sodium (Element)	

37. i. Since, 1 pm = 1×10^{-12} m ,
    $\therefore$ 28.7 pm = [28.7 pm $\times$ 10^{-12} m / pm]
    = 2.87×10^{-11} m
    ii. Since, 1 pm = 1×10^{-12} m
    $\therefore$ 15.15 pm $\times$ 10^{-12} m /pm
    = 1.515×10^{-11} m
    iii. Since 1 mg = 10^{-6} kg
    therefore, 23565 mg = [25365 mg $\times$ $\frac{1g}{1000mg}$ $\times$ $\frac{1kg}{1000g}$]
    = 2.5365×10^{-2} kg
    = 2.5365×10^{-2} kg
38. The thermometer with Celsius scale are calibrated form 0^o (lower limit) to 100^o (upper limit).
    Where, These two temperatures i.e. 0^o and 100^o are the freezing and boiling points of water respectively.
39. We know that, 1 ns = 10^{-9} s.
    2.00 ns= 2 .00 $\times$ 10^{-9} s
    Therefore, Distance covered by light = speed $\times$ time = 3.0×10^8 m s^{-1} $\times$ 2.00 $\times 10^{-9}$ s = 0.6 m
40. It is defined as the standard of reference chosen to measure a physical quantity.
41. SI unit of mass is **kilogram (kg).**

Definition: One kilogram (1 kg) is defined as the mass equal to the mass of the international prototype of the kilogram.

42. The constituents of a compound can be separated by physical and chemical methods.

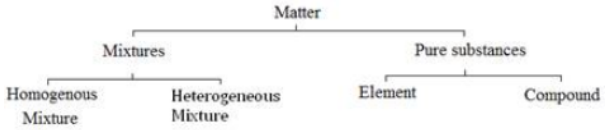
Section B

43. (a) - (ii), (b) - (iii), (c) - (iv), (d)- (i)
44. (a) -(ii), (b) - (i), (c) - (iv), (d)- (iii)
45. (a) - (ii), (b) - (iv), (c) - (i), (d)- (iii)
46. (a) - (ii), (b) - (iv), (c) - (i), (d)- (iii)
47. (a) - (iv), (b) - (iii), (c) - (ii), (d)- (i)
48. (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
49. (a) - (ii), (b) - (iv), (c) - (i), (d)- (iii)
50. Solid particles have a definite shape as well as volume while liquid particles have fixed volume, not shape. Sugar particles occupy fixed shape as well as a volume so it is solid while water particles occupy fixed volume not shape therefore it is a liquid.
51. Given, Mass of the pebble = 150 g.
    The water level in a metric measuring cup = 0.75 L (Given)
    The water level after submerging the pebble is 0.82 L (Given)
    Therefore, The volume displaced by the pebble= 0.82-0.75 = 0.0.7 L = 70 mL
    Therefore, density of the pebble $= \frac{\text{Mass}}{\text{Volume}} = \frac{150}{70} = 2.14\text{gmL}^{-1}$
52.

S.No.	Prefix	Mupltiples
1.	micro	10^{-6}
2.	deca	10
3.	mega	10^{6}
4.	giga	10^{9}
5.	femto	10^{-15}

53. We know that 1 in = 2.54 cm
    From this equivalence, we can write
    $\frac{1\text{in}}{2.54\text{cm}} = 1 = \frac{2.54\text{cm}}{1\text{in}}$
    Thus, $\frac{1\text{in}}{2.54\text{cm}}$ equals 1 and $\frac{2.54\text{cm}}{1\text{in}}$ = 1
    Say, the 3 in given above is multiplied by the unit factor. So,
    3 in = 3 in $\times$ $\frac{2.54\text{cm}}{1\text{in}}$ = 3 $\times$ 2.54 cm = 7.62 cm
54. In the laboratory volume of a liquid can be measured by using graduated cylinder, burette, pipette etc.
    Conversion of 0.5L into mL:
    We know that, 1L = 1000 mL
    Therefore, 0.5L = 500 mL
    Conversion of 30cm^3 to dm^3:
    We know that, 1000cm^3 = 1dm^3
    Therefore, 1 cm^3 =1/1000 dm^3
    Hence, 30 cm^3 = $\frac{1}{1000} \times 30\ dm^3$ = 0.03dm^3
55. We know that, 1 min = 60 s
    Conversion factor = $\frac{60\text{s}}{(1\text{min})}$
    2.6 min = 2.6 min $\times$ conversion factor = 2.6 $\times \frac{60\text{s}}{1\text{min}}$ = 156 s
56. **Matter:** Anything which has mass and occupy space is known as matter. Matter can be classified into two categories:
    1. **Physical classification.**
    2. **Chemical classification.**

    Macroscopic (Chemical) classification of matter: Here, It is broadly classified into two categories
    I. **Pure substance :** Pure substances are those substances which are made up of only one kind particles. Further, Pure is classified into two categories **Element and Compound.**
    II. **Mixture :** A mixture is a substance made by combing two or more substance without any chemical bonding. Also, Mixture is classified into two categories **Homogeneous mixture and Heterogeneous Mixture.**



57. Pressure is the force (i.e. weight) acting per unit area of the surface.

P = F/A

Substituting the given values, we get-

P = [(1034g $\times$ 9.8 ms^{-1})/cm^2] $\times$ [1kg/1000g] [(100)^2 cm^2/1m^2]

= 1.01332 $\times$ 10^5 kg m^{-1} s^{-2}

We know that,

1 N = 1 kg ms^{-2}

Then ,

1 Pa = 1 Nm^{-2} = 1kg m^{-2} s^{-2}

so, 1 Pa = 1kg m^{-1} s^{-2}

therefore , Pressure = 1.01332 $\times$ 10^5 Pa

58.

S.No.	Prefix	Value
1.	Pico	10^{-12}
2.	nano	10^{-9}
3.	centi	10^{-2}
4.	deci	10^{-1}

59. Mass of solute = 62.3 g

Equivalent mass of oxalic acid = $\frac{249.5}{2}$ = 124.75g

Gram equivalents of oxalic acid = $\frac{62.3}{124.75}$ = 0.5

Volume of solution = 500 mL

Normality = $\frac{0.5}{500}$ $\times$ 1000 = 1N

60. The distance covered is calculated using the relation,

Speed = $\frac{\text{Distance covered}}{\text{time taken}}$

or, distance covered = Speed $\times$ time

Substituting the given values of speed = 3.0 $\times$ 10^8 ms^{-1}

& time taken = 2.00 ns, we get

Distance covered = speed $\times$ times

= 3.0 $\times$ 10^8 ms^{-1} $\times$ 2.00 ns

(Since 1.00 ns = 10^{-9} sec), therefore

= 3.0 $\times$ 108 ms^{-1} $\times$ 2.00 ns $\times$ $\frac{10^{-9}s}{1ns}$

= 6.00 $\times$ 10^{-1} m

or = 0.600 m

61.

S.No.	Mass	Weight
1.	The mass (m) of a substance is the amount of matter present in it.	Weight is the force exerted by gravity on an object
2.	It is a scalar quantity.	It is a vector quantity.
3.	The mass of a body is constant and does not change from place to place.	The weight of a body is not constant, it changes place to place.
4.	It can not be zero.	It can be zero.
5.	It is measured in kg.	It is measured in Newton(N).

The mass of a substance is determined with the help of an analytical balance in laboratory.

62. **Conversion of 35^0C to ^{o}F :**

We know that**,** $F = \frac{9}{5}(^\circ C) + 32$

$F = \frac{9}{5}(35) + 32$ = 63 + 32 = 95^{o}F

Conversion of 35^0C to K:

We know that, K = ^{o}C + 273.15 = 35 + 273.15= 308.15K

63. Here, we know 1 day = 24 hours (h)

or $\frac{1\text{day}}{24\text{h}} = 1 = \frac{24\text{h}}{1\text{day}}$

then, 1h = 60 min

or $\frac{1\text{h}}{60\text{min}} = 1 = \frac{60\text{min}}{1\text{h}}$

so, for converting 2 days to seconds,

i.e., 2 days _____ = _____ seconds

The unit factors can be multiplied in series in one step only as follows:

2 day $\times \frac{24\text{h}}{1\text{day}} \times \frac{60\text{min}}{1\text{h}} \times \frac{60\text{s}}{1\text{min}}$

= 2 $\times$ 24 $\times$ 60 $\times$ 60 s

= 172800 s

Section C

64. **(d)** Azidothymidine

Explanation: Azidothymidine

65. **(b)** Gases

Explanation: Gases

66. **(b)** III and I

Explanation: III and I

67. **(b)** Gandhayukli

Explanation: Gandhayukli

68. **(d)** c

Explanation:

Gas change into liquid	on heating

Section D

69. Fill in the blanks:

(i) 1. Chemistry

(ii) 1. Mass, space

(iii) 1. Composition, properties

(iv) 1. Einstein

(v) 1. Isomerisation

(vi) 1. Copper

(vii) 1. Ductility