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CONCEPTS & COMPETENCE
A Solution... to get you Ahead !
PRE-FINAL ASSESMENT
Synchro - School Program
Foundation - IX & SPIRE
Special Preliminary Initiative for National Level Exams
P-F-A
A Foundation Stone for NTSE / STSE / IJSO/ Kishore Vaigyanik / M-Sc Olympiads / IIT / PMT / MBA / IAS

Time Allowed: 1.5Hrs **MM.: 40**

PRE-FINALS SCIENCE (Std. IX)

CHEMISTRY SYLLABUS SOLUTION KEY

Ans1. Increasing order of density:
Air < exhaust from chimneys < cotton < water < honey < chalk < iron

Ans2. The temperature of both boiling water and steam is 100°C, but steam has more energy because of latent heat of vaporisation.

Ans3. (a) The sweat is readily evaporated from the body by the air from the fan. As a result, we feel comfortable under a fan.
(b) (i) Liquid state, (ii) Gaseous state.

Ans4. (a) i. The molecules of a gas possess high kinetic energy and ii very weak intermolecular force of attraction.

(b) Any 2
i. Its MP is less than Room Temp. ii. Its B.P is greater than Room Temp.
iii It has property to flow iv. It has no fixed shape and volume

(c) Any 2
i. Its MP is more than Room Temp. ii. Its B.P is greater than Room Temp.
iii It cannot flow iv. It has fixed shape and volume

(d) **Solids have very strong intermolecular force of attraction among their particles while intermolecular force of attraction is very poor in case of gases**. Due to this reason, we are able to easily move our hands in air but cannot do the same through a solid block of wood.

Ans5. Mass of sodium chloride = 36 g
Mass of water = 100 g
Total mass of the solution = (36 + 100) g = 136 g
Mass of NaCI

Concentration (mass percentage) of solution $= \frac{\text{Mass of NaCl}}{\text{Mass of solution}} \times 100$

$= \frac{36g}{136g} \times 100$

= 26.47%

Ans6. (a) mixture of kerosene and petrol can be separated by fractional distillation.
(b) Centrifugation (c) Evaporation (d) Sublimation

Ans7. (a) **Sample 'B'** will not freeze at 0°C because it is not pure water. At q atm, the boiling point of pure water is 100°C and the freezing point water is 0°C.

(b) ***Simple Distillation to SEPARATE A MIXTURE OF TWO MISCIBLE LIQUIDS.***

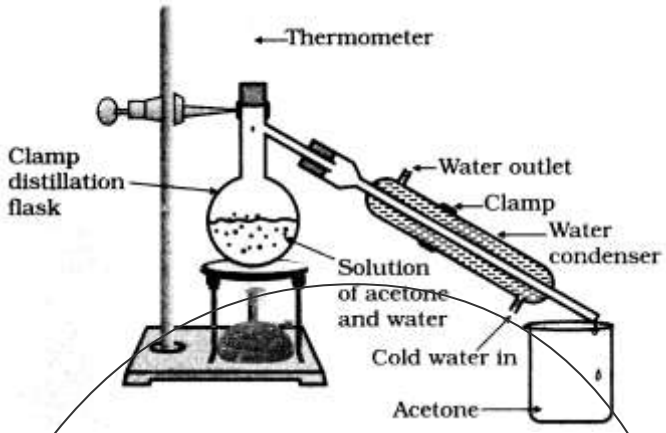
Principle: Sufficient difference in Boiling Points

Steps:

1. Let us try to separate **acetone**(**B.P 329K**) and **water(B.P 373K)** from their mixture.
2. Take the mixture in a distillation flask. Fit it with a thermometer.
3. Arrange the apparatus as shown in Fig.
4. Heat the mixture slowly keeping a close watch at the thermometer.
5. The acetone vaporises, condenses in the condenser and can be collected from the condenser outlet.

6. Water is left behind in the distillation flask.

Set Up:



Recordings:

1. As you start heating the mixture the temperature in thermometer starts rising.
2. At 329K the thermometer reading become constant for some time BECAUSE EVAPORATION OF ACETONE starts.
3. This method of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points.

Ans8. (a) (i) Physical change (ii) Physical change (iii) Chemical change
(iv) Physical change (v) Chemical change (vi) Physical change
(vii) Physical change (viii) Chemical change

(b) Any two

True solution	Colloid
1. A true solution is a homogeneous mixture of two or more substances.	1. A colloidal solution is a heterogeneous mixture of two substances.
2. The size of the particles is less than one nanometer. .	2. The range of particle size is between one nanometer to 1000 nanometer.
3. It is always transparent.	3. It is translucent.
4. The particles cannot be seen even with microscope.	4. The particles of a colloidal solution can be seen with microscope.
5. It does not show Tynball effect.	5. It shows Tynball effect.

(c) Any Two

Compounds	Mixtures
1. Compounds are formed as a result of chemical reactions between two or more elements or compounds.	1. Mixtures are formed by simply mixing two or more constituents. There are no chemical reactions between the constituents
2. The components of a compound are always present in a definite ratio by mass.	2. The components of a mixture may be present in any ratio.
3. The properties of a compound are entirely different from its constituents.	3. The properties of a mixture are same as those of its constituents
4. Compounds are always homogeneous in nature.	4. Mixtures are usually heterogeneous (except in solutions).
5. Compound formation is accompanied by absorption or evolution of light, heat or electrical energy.	5. Heat, light or electrical energy may not be evolved or absorbed during the formation of a mixture.
6. Melting and boiling points of a compound are usually sharp and fixed.	6. Melting and boiling points of a mixture are usually not sharp and fixed.
7. The constituents of a compound cannot be separated by physical or mechanical means. They can, however, be separated by chemical methods.	7. The components of a mixture can be easily separated by physical methods.

Ans9. Since hydrogen and oxygen combine in the ratio of 1 : 8 by mass, 3 g of hydrogen gas will react completely with 24 g of oxygen gas.

Ans10. Mass of 6.022×10^{23} atoms of carbon = 12 g

Mass of 1atom of carbon = $\frac{16}{6.022 \times 10^{23} \text{g}}$ ...(1)

Mass of 6.022×10^{23} atoms of oxygen = 16 g

Mass of 1 atom of oxygen = $\frac{16}{6.022 \times 10^{23} \text{g}}$ ...(2)

On dividing (1) by (2), we get

$$\frac{\text{Mass of carbon}}{\text{Mass of oxygen}} = \frac{12}{16}$$

Mass of carbon atom = $\frac{3}{4} \times$ mass of oxygen

So, mass of carbon atom is $\frac{3}{4}$ times that of oxygen atom.

Ans11. (a) Molecular weight of $Al_2O_3 = 2 \times 27 + 3 \times 16$
$= 54 + 48 = 102$ g

102 g of Al_2O_3 contains = $2 \times 6.022 \times 10^{23}$ Al^{3+} ions.

0.051 g of Al_2O_3 contains = $\frac{2 \times 6.022 \times 10^{23}}{102} \times \frac{51}{1000}$ = 6.022 x 40^{20} $A1^{3+}$ ions

(b) (i) Tri-atomic molecules are $CaCl_2$, H_2O.

(ii) Tetra-atomic molecules are NH_3, PCl_3.

Ans12. (a) 4 mole of hydrogen atom = 1 g
Or 6.022×40^{23} atoms of hydrogen weigh = 1 g

Mass of one atom = $\frac{1}{6.022 \times 10^{23}} g$

= 1.66058 10^{-24} g

(b) Formula mass of sodium carbonate
= (2 × atomic mass of Na) + (1 × atomic mass of C) + (3 × atomic mass of O) + 10 [(2 × atomic mass of H) + (l × atomic mass of O)]
= 2 × 23 + 1 × 12 + 3 × 16 + 10[(2 × 1) + (l × 16)]
= 46 + 42 + 48 + 180 = **286 u**

(c) Gram molar mass of NaOH = 23 + 16 + 1 = 40 g
40 g of NaOH = 1 mol

$\therefore$ 1 g of NaOH = $\frac{1}{40}$ mol

$\therefore$ 4 g of NaOH = $\frac{1}{40} \times 4$ mol = **0.1 mol**

(d) (i) Na_2O (ii) $AlCl_3$ (iii) Na_2S (iv) $Mg(OH)_2$

Ans13. In the Rutherford's experiment, a very thin foil (0.00006 cm thick) was used. *a*—particles are much smaller than the gold atoms present in the foil.
If any other less malleable element other than gold is used, **the *a*—particles may not be able to penetrate the thick foil**.

Ans14. (i) Atomic number will be **8**.
(ii) Charge on the atom would be **<u>zero</u>** because number of the positive charges (protons) and negative charges (electrons) are equal.

Ans15. (a) (i) He was not able to explain that why a negatively charged electron **DO NOT FALL** in the positively charged nucleus by slowly losing its energy.
(ii) According to Rutherford, the electrons revolve around the nucleus in fixed orbits. However, **Rutherford did not specify the number of orbits** and the number of electrons in each orbit.

(b) Atomic mass of element X = 16.2u

Let the percentage of the isotope $^{16}_{8}X$ be Z.

Percentage of the isotope $^{18}_{8}X$ = (100 – Z)

$$\text{Atomic mass of 'X'} = \frac{Z\times16u+(100-Z)\times18u}{100}$$

$$16.2u = \frac{Z\times16u+(100-Z)\times18u}{100}$$

$$1620u = 16uZ + 1800u - 18uZ$$

$$2uZ = 180u$$

$$Z = \frac{180u}{2u} = 60\%$$

Ans16. (a) $^{209}_{84}X$ and $^{210}_{84}X$ are isotopes.

(b) MCl_2

(c) –2

(d) Isobars