KEY POINTS

- Anything that has mass and occupies space is called matter.
- Plasma is an electrically charged gas, which is affected by electrical and magnetic fields.
- The property of an element to exist in different physical forms is called allotropy.
- Element: the simplest form of matter made up the same type of atoms
- Compound: A substance formed when two or more different atoms chemically combine.
- A homogeneous mixture of two or more components is called solution.
- Aqueous solution is formed by dissolving a substance in water.
- A solution containing maximum amount of solute at a given temperature is called saturated solution.
- A solution which contains lesser amount of solute than that which is required to saturate it at a given temperature, is called unsaturated solution
- A colloid is a mixture that has particles ranging between 1 and 1000 nanometers in diameter
- A suspension is defined as a heterogeneous mixture in which the solid particles are spread throughout the liquid without dissolving in it
- **References for additional information**
- Matter and its properties: Joseph Midthun, Paul Kobasa
- Cambridge IGSE™ Chemistry 5th Edition
- Cambridge International AS & A Level Chemistry (9701)

REVIEW QUESTIONS

1. Encircle the correct answer.

(i) Anything that has mass and occupies space is called.

(a) Liquid (b) Gas
(c) solid (d) Matter

(ii) Following are states of matter

(a) Gas (b) Liquid
(c) Solid (d) All of these

ii) Macroscopic properties are properties that can be visualized by

(a) the naked eye (b) microscope
(c) electron microscope (d) telescope

(iv) Matter can be described by both its

(a) physical properties and chemical properties.

(b) physical properties (c) chemical properties.

(v) A substance formed when two or more different elements combine chemically

(a) atom (b) compound

(c) element (d) solution

2. Give short answer.

(i) Can you write the formula of the carbon dioxide gas that we exhale?

(ii) Define the element, Compound, Mixture

(iii) Differentiate between compound and mixture

(iv) Differentiate between concentrated and dilute solution

3. Define the term Allotropes Explain the allotropes of Carbon

4. What is difference between Homogeneous and heterogeneous solution?

5. Differentiate between the colloids, suspension and solution.

6. If there are 18 protons in the Argon atom, then what is the atomic number of Argon?

7. Describe State of matter with example

8. Differentiate between the following.

a. Colloids and Suspensions

b. Elements and Compounds

c. Concentrated and Dilute solutions

9. Examine the concept of solubility.

THINK TANK

10. Why is a solution considered mixture?

11. How will you test weather given solution is a colloid or a solution?

PROJECT

Create a poster that illustrates the various form of matter in the students everyday environment.

30th April 2024. Chem Tuesday

CHAPTER: 2 [MATTERS]

i- The chemical formula for carbon dioxide gas is CO_2

ii- **Element:** An element is a substance make up of atoms that all have the same number of protons, each element is represented by a unique chemical symbol.

For example:

Hydrogen (H), Oxygen (O) etc

Compound: A compound is a substance composed of 2 or more different elements chemically bonded together in fixed proportion. Compound can be represented by chemical formula.

For example:

Water (H_2O), Sodium Chloride (NaCl) etc

Mixture: A combination of 2 or more substances in which each substances retains its own chemical identity and properties.

For example:

Salt in water, air, salad etc.

iii. **Differences**

Compound	Mixture
• A compound is a substance composed of two or more element chemically bounded together	A mixture is a combination of 2 or more substances that are physically combined but chemically not bounded
• The component of compound is in fixed proportion and the chemical between the atoms are specific.	• The component of mixture can be present in any proportion and their identities remain unchanged.
• Compound have unique properties different from the elements they are composed of e.g: water (H_2O), Carbondioxide (CO_2)	• Mixture can be homogeneous or heterogeneous e.g: salt, water, air

iv.

Concentrated Solution	Dilute Solution
• A solution with a large amount of solute dissolved in a smaller amount of solvent	• A solution with a small amount of solute dissolved amount of solvent ratio.

• In other words, it has a high solute to solvent ratio.	• In other words, it has a low solute to solvent ratio
• For e.g. Concentrated orange juice has a strong taste because it contains a higher amount of dissolved orange solids in a small volume of water.	• For e.g Diluted bleach contains a small amount of bleach (solute) dissolved in a larger volume (solvent), resulting in a less potent solution for cleaning.

Answer: 3

• **Allotropes**: The property of an element to exists in different physical form is called Allotropy. These different forms in the same physical state are called allotropes. Atom of the same element arranged in different manners in the same physical allotropes. They are different structural forms of same element For e.g: Diamond, graphite and bucky balls are 3 important allotropes of carbon.

• **Graphite:** Graphite is composed of flat 2 dimensional layers of hexagonal arranged carbon atoms. In each layer, each carbon atom is covalently bonded to 3 other carbon atoms. Weak intermolecular bonds exist between each layer which allow the layers to slide over one other without breaking the bonds. This arrangement makes graphite soft and slippery making it ideal to be used as a lubricant. Graphite is good conductor of electricity.

• **Diamond:** Diamond is the hardest and the purest crystalline allotropes of carbon. In its structure, each C-atom is covalently bonded with other 4 carbon atoms forming a riged network of tetrahedral shape. The tetrahedral, three dimensional arrangment make it the hardest substance with a very high melting point since all the carbon atoms are bonded with another carbon atoms, no free electrons are present resulting in the structure being non-conductive. Diamond is a non-coductor of electricity

• **Bucky balls (C-60):**

Bucky balls also known as fullerenes, have a football like fused hollow ring structure made up of twenty hexagons and twelve pentagons. Each of its 60 carbon atoms are bonded to 3 carbon atoms.

Answer: 4

a

Homogenous mixture	Heterogenous mixture
→ Homogeneous solution have uniform composition and properties throughout, meaning all components are evenly distributed.	→ Heterogeneous solutions have composition with visible differences in properties and concentration within the mixture.
→ For example: salt water, air etc.	→ For example: sand water, soil.

Answer: 5

b

COLLOID	SUSPENSION
→ A heterogeneous mixture of two or more components.	→ A heterogenous mixture of two or more components
→ Particle size vary from $1-10^3$ nm. visible by naked	→ Particle size greater that 10^3 nm. visible by naked eye.
→ Particle can pass through normal filter paper but not through	→ Particles cannot pass through normal as well as ultra. filter paper.

ultra-filter paper.	
→ can scatter the light (tyndall effect)	→ can scatter light (tyndal effect)
→ Does not separate	→ separate or settles down when stationary
→ Example: Milk	→ Example: Muddy water

Answer: 6

The solvent is the component in a solution that is present in large amount and dissolves the solute. The solute is a component that is dissolved in the solvent.

Answer: 8

The atomic number of an element is equal to the number of protons in its nucleus. Since you mentioned there are 18 protons in the Argon atom the atomic number of Argon is also 18.

Answer: 87

STATES OF MATTER:

There are four states of matter.

1. Gas
2. Liquid
3. Solid
4. Plasma

30th April 2024. Classwork Tuesday

Each state is distinct form of matter

(1) States of matter are the different forms in which matter can exist. There are solids, liquids, gases and plasmas. These states are determined by the arrangment and movement of particles and the strength of intermolecular and atomic forces.

(2) Energy can change matter into different states. For example solids become liquid or gases when heated. At every high temperatures or when subjected to a strong electric field, the gas transforms into plasma. Under normal conduction, most substances remain in one distinct state: solid, liquid or gas. Temperatures and energy levels on the Earth are not sufficient to ionize atoms and create plasma.

(3) When heated, some crystalline solids turn into cloudy liquids that completely dissolve. This cloudy state is called liquid crystal. Liquid crystal state has many properties of liquids and some properties has many properties of liquids and some properties of solids. This form exists within a certain temperature range. When heated further, the state of liquid crystal changes to transparent liquid.

(4) Furthermore, there are other states such as Bose-Einstein Condensate (BEC) which is defined as state of matter in which separate atoms cooled to temperatures very close to absolute zero BEC is observable under extreme conditions of cold temperature. Superfluid and superconductors are the two main materials which contains BEC.

Answer: 8(b)

Element	Compound
→ Elements are pure substances made up of only one type of atom and they cannot be broken down into simpler substances by chemical means.	→ Compounds are substances that are made up of two or more different types of atoms chemically bonded together in fixed proportions.
→ Elements retain their properties and cannot be further simplified	→ While compounds have properties distinct from their constituent element and can be broken down into simpler substances through chemical reactions.

30th April 2024 Chemistry Tuesday

Answer: 09

Solubility refers to the ability of a substance, known as the solute, to dissolve in a solvent to form a saturated solution. It is influenced by factors like temperature, pressure and solute-solvent interaction. Solubility is often expressed in terms of grams of solute per 100g of solvent.

"THINK TANK"

Answer #01:

A solution is considered mixture because it consists of two or more substances (physically combined, where the substance retain their individual properties. In a solution, one substance (solute) is dissolved in another substance (solvent)).

Answer #02:

To determine whether a given solution is colloid or true solution, we can perform several tests.

1. **Tyndall effect:** Shine a light through it, if we see the light scatter, it's like a colloid.
2. **Particle size:** If we can see the particles floating around, it might be a colloid.

3- **Setting:** Let it sit, if it stays mixed for a long time, it could be a colloid.

4- **Filtering:** Try to filter it, if it doesn't pass through easily, it might be a colloid.

These tests help figure out if it's a colloid or just a true solution.