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Physical States of Matter: Solid, Liquid and Gases

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Abstract

Catalytic growth is a powerful tool to form a variety of wire (whisker) like structures with diameters ranging from just a few nanometres to the millimetre range. A range of phases (gas, solid, liquid, solution and supercritical fluid) have been used for the feeder phase, i.e. the source of material to be incorporated into the nanowire. Solid, liquid and Gases. As we looking our surrounding we see a larger number variety of things with different shapes size and textures. Everything in this universal is made up of a material we scientist have named "Matter" the air we breathe, the food we eat ,stones, cloud, stars, plants and animals even small drop water or a particle who said -everything is matter. We also look at around that all things of mentioned above occupy space and Mass. In other words, they have both mass and vellum Human beings try to understand their surrounding. Every earlier Indian philosophers classified matter in the form of 5 basic elements - air, earth, fire sky and W water. According to them everything, living or non living was made up of these five basic elements.

Modern day scientist have two types of classification of matter depend on their physical and chemical properties. In this we have learn about the most of the observable properties of a material are bulk properties which are associated with the collection of large number of individual particles. These are very important for us because these are helpful for us and by this process we can understand how the world works. For example we know that an individual molecule of a liquid does not boil but the large number of liquid molecules boil. The individual water molecules do not wet but water which represents a collection of water molecules has wetting properties. In this we have learnt about the different forms of water such as ice (in solid form) liquid water and steam (in gaseous form). In the all three states of water, chemical composition is same (H2O) but the physical properties (Shape, size, colour etc) are very different. So it is very important to learn about the three states of matter.

- **Introduction: -**

In this firstly we will discuss about 'Matter'. What is 'Matter'? Matter is defined in the form of we see everything around us which occupies some space and mass is called matter. Matter in the states Solid, Liquid and Gas. The important characteristics of these three states are defined below:-

- **Solid States:-**In solid state the particles are closely packed. The intermolecular force of attraction between the particles is very large but the intermolecular space is less present. So these particles do not move from one place to another place only the particles can vibrate their mean position. A solid possesses a definite shape, size and volume. Solids are generally hard and rigid. The shape of the solid can be changed but is usually requires considerable force. Some common examples of solids are iron, silver, sugar, ice etc. A rubber band changes shape under forces and regain the same shape when the force is removed. If Excessive Force is applied It breaks. The shape of individual sugar or salt crystal remain fixed. whether we take it in our hamd, put it in a. plate or in a jar. A sponge has minute holes in which air is trapped. when we press it the air is expelled out and we are able to. Compress it.
- **Liquid State: -** In this state the particles are losely packed as compared to Solid. In this state the intermolecular force of attraction between the particles is less but inteamolecular space is large as compared to Solid. So the liquid particles move from one place to anothers.
- A liquid possesses a definite volume but not definite shape. It takes up the shape of the container in which it is placed. Some common examples of liquid are water, alcohol, milk etc. We see that solids and liquids can diffuse into Liquids .The gases from the atmosphere diffuse and dissolve in water.The gase especially oxygen and carbondioxide are essential for the survival of aquatic plants and animals.All living things need to breathe for survival . The aquatic animals can breathe under water due to the presence of dissolved oxygen in water.So we can see That solid, Liquid and gases diffuse into liquid.The rate of diffusion is higher than

that of Solid.This is due to the fact that in the liquid state , particles move freely and have greater space between each other as compared to partclesin the solid. State.

- **Gaseous State**: - In this state the particles are freely move in nature and losely packed. It has no definite shape and volume. A gas occupies the whole of the volume of the vessel in which it is placed. It also takes up the shape of the container. For example:- air, Carbondioxide, Hydrogen, Helium etc. The liquefied petroleum gas (LPG) cylinder thar can we get in our homes for cooking or the oxygen supplied to hospitals im cylinder is compressed gas. CNG is used as a fuel these days in vehicles. Due to high compressibilty large volume of a gas can be compressed into a small cylinder and transported easily.
- It may be noted that now scientist are talking about five states of matter. In addition to Solid, Liquid and gaseous state, there are two more states of matter known as plasma and Bose Einstein Condenstate (BCE)
- The plasma state consists of Super energetic and super excited particles and exist at very temperatures. Plasma is an ionized gas, the gas into which sufficient energy is provided to free electron from atoms or molecules And to allow both species. I. e ions and electrons to coexist. The fluorescent tube and neon sign bulbs consiat of plasma . The sun and the stars also glow because of the presence of plasma in them.
- The fifth state is Bose Einstein Condenstate which consist of supercooled solid in which the atoms lose their individual identity and condense to form a single super atom. For example, The BEC state is formed by cooling a gas of extremely low density (about one hundredth of the density of air to super low temperature.
- In the literature we might variously encounter nanowires (solid core structures with diameters below ~100 nm), nanotubes (single or multi-walled hollow core structures with diameters below ~100 nm) and whiskers (larger solid core structures). For simplicity, I will use the term nanowire generically to describe the structures formed by catalytic growth unless I specifically want to call attention to nanotubes or whiskers. This review does not attempt to be exhaustive. Rather it looks first at a number of materials systems that have been grown catalytically in the form of nanowires, nanotubes or whiskers in the past year or two. Then a review of the mechanistic aspects of catalytic nanowire growth is made.
- Solid, liquid, eutectic, alloy and metastable phases have all been invoked to explain the structure of the catalytic particle. Rather than focussing on the differences that lead to the proliferation of an alphabet soup of names for the various growth techniques, this review attempts to focus on the similarities between all of these catalytic growth processes in an attempt to help stimulate a more universal understanding of the phenomenon.
- **Conclusion**: -
- Characterization studies of catalytic growth are demonstrating an ever larger array of systems that exhibit the growth of nanowires and nanotubes. Howerver it may be noticed that is substance exist in any of three states in appropriate condition of temperature and pressure. As we all know that9 water can exist in three states of matter as ice(Solid), water(liquid) or steam (gas).In general , a substance is said to be :
- . a solid is melting point is above room temperature in atmospheric pressure;
- . a liquid is melting point
- is below room temperature and boiling point is above room temperature.
- . a gas its boiling point is below room temperature under atmospheric pressure.xe
- otherwise, is becoming increasingly sophisticated. However, may questions still remain unanswered particularly regarding the size and position of the catalyst relative to the nanowire, in other words, regarding aspects of float versus root growth.
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