

ONLINE TEACHING MATERIAL

CHEMISTRY

SESSION-2020-21

CLASS-IX

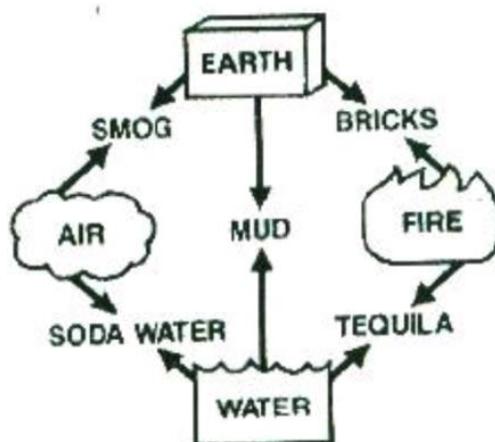
TOPIC: MATTERS IN OUR SURROUNDING

DAY-1

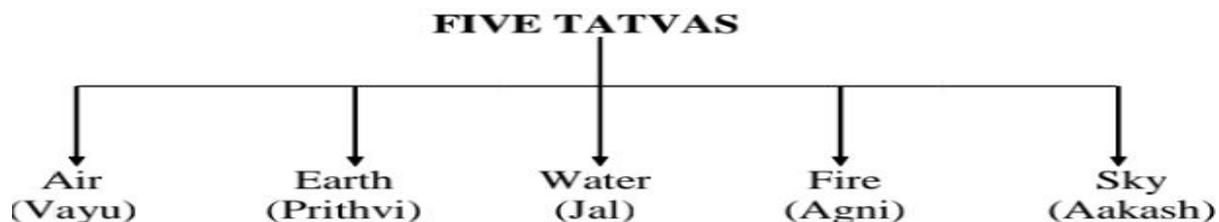
❖ TEACING MATERIAL

- A pencil, a pen , a table , the food we eat, the clothes we wear, the walls of our houses – everything around is made up of matter. But What is matter ?
- Matter is anything that occupies space, has mass and can be perceived by our senses . In other words
- “Matter is used to cover all the substances and the materials from which the universe is made .”

➤ COMPOSITION OF MATTER

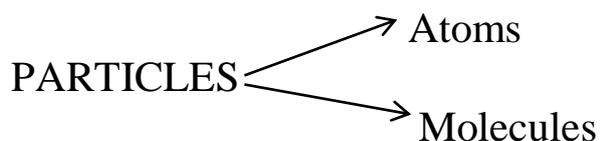


- In ancient time , according to the researchs carried on our religious books and scriptures , the Indian Philosphers stated that matter is made from five consitituents or tatvas.



➤ **MATTER IS MADE UP OF PARTICLES**

- Now that we have defined matter let us ask ourselves the question – What is matter made up of?
- All matter comprises of very small particles .
- All matter can be broken up in a similar manner to get very small particles .
- Hence we now conclude that all matter is made up of small particles.



❖ VIDEO-LINKS

LINK-1

<https://www.youtube.com/watch?v=2DusB9XEEnc>

LINK-2

<https://www.youtube.com/watch?v=OjEIFVfHdWs>

❖ ASSIGNMENT

- 1) Define matter.
- 2) All matters have __ constituents
 - a) 2
 - b) 3
 - c) 5
- 3) Name all the constituents of matter.

❖ TEACING MATERIAL

Characteristics of particles of matter

- Made of tiny particles.
- Vacant spaces exist between particles.
- Particles are in continuous motion.
- Particles are held together by forces of attraction.

States of Matter :-

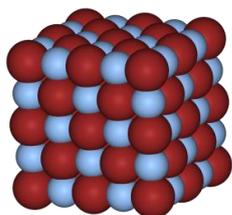
Basis of Classification of Types

- Based upon particle arrangement
- Based upon energy of particles
- Based upon distance between particles

Five states of matter

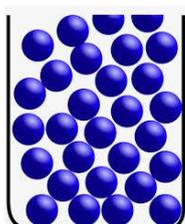
- 1. Solid
- 2. Liquid
- 3. Gas
- 4. Plasma
- 5. Bose-Einstein condensate

I SOLID



- Fixed mass, volume and shape
- Inter-particle distances are least.
- Incompressible.
- High density and do not diffuse
- Inter particle forces of attraction are strongest.
- Constituent particles are very closely packed.

II LIQUID



- Not fixed shape but fixed volume and mass.
- Inter particle distances are larger than solid.
- Almost incompressible.
- Density is lower than solids and can diffuse.
- Inter particle forces of attraction are weaker than solids .
- Constituent particles are less closely packed.

III GAS



- Neither fixed shape nor fixed volume.
- Inter particle distances are largest.
- Highly compressible.
- Density is least and diffuse.
- Inter particle forces of attraction are weakest.
- Constituent particles are free to move about.

IV PLASMA (NON-EVALUATIVE)

- A plasma is an ionized gas.
- A plasma is a very good conductor of electricity and is affected by magnetic fields.
- Plasma, like gases have an indefinite shape and an indefinite volume. Ex. Ionized gas

V BOSE-EINSTEIN CONDENSATE (non –evaluative)

- A BEC is a state of matter that can arise at very low temperatures.
- The scientists who worked with the Bose-Einstein condensate received a Nobel Prize for their work in 1995.
- The BEC is all about molecules that are really close to each other (even closer than atoms in a solid).

❖ VIDEO-LINKS

<https://www.youtube.com/watch?v=05aSh6WiTkE>

❖ PPT LINKS

<https://www.youtube.com/watch?v=0njPfd8Uo88>

❖ ASSIGNMENT

- 1) Write the characteristics of particles of matter.
- 2) Give 2 examples of plasma.
- 3) Define kinetic theory of matter.

DAY-3

❖ TEACING MATERIAL

Microscopic Explanation for Properties of Solids

Solids have a definite shape and a definite volume because the particles are locked into place.

Solids do not flow easily because the particles cannot move/slide past one another

Solids are not easily compressible because there is little free space between particles

Microscopic Explanation for Properties of Liquids

Liquids are not easily compressible and have a definite volume because there is little free space between particles.

Liquids flow easily because the particles can move/slide past one another.

Liquids flow easily because the particles can move/slide past one another.

Microscopic Explanation for Properties of Gases

Gases are easily compressible because there is a great deal of free space between particles

Gases flow very easily because the particles randomly move past one another.

Gases have an indefinite shape and an indefinite volume because the particles can move past one another (non –evaluative)

Microscopic Explanation for Properties of Plasmas

Plasmas have an indefinite shape and an indefinite volume because the particles can move past one another.

Plasmas are easily compressible because there is a great deal of free space between particles.

Microscopic Explanation for Properties of BEC

Particles are less energetic than solids because Exist at very low temperature.

Particles are literally indistinguishable because they are locked into same space .

BEC shows super fluidity because Particles can flow without friction.

DIFFERENCE BETWEEN THE STATES OF MATTER

STATES OF MATTER

www.majordifferences.com

Properties	Solids	Liquids	Gas
1. Volume	Definite volume, as intermolecular forces between the constituent particles are very strong.	Definite volume, as intermolecular forces between the constituent particles are strong.	No definite volume, as intermolecular forces between the constituent particles are weak.
2. Diffusion	Can diffuse into liquids.	Diffusion is higher than solids.	Highly diffusible as particles move randomly at high speed.
3. Compressibility	Negligible	Negligible	High
4. Rigidity or Fluidity	Very rigid and cannot flow	Less rigid and can flow easily.	No rigidity and can flow most easily.
5. Density	High	Moderate	Low
6. Shape	They have a definite shape	They do not have a definite shape.	They do not have a definite shape.
7. Kinetic energy of particles at a given temperature	Least energy	Higher than solids	Maximum energy
8. Interparticle space	Least	Lesser	More than others
9. Interparticle force of attraction	Very strong	Less strong	Weak
10. Intermolecular forces	Strong enough to hold the constituent particles in fixed positions.	Strong enough to hold the constituent particles in aggregation within the bulk but not in fixed positions.	Extremely low, so that the constituent particles are free to move in a continuous random motion.
11. Arrangement of molecules	Packed in definite pattern so they possess a definite geometry.	Packed weak in comparison to solids, shape not fixed.	Packed very poorly so they fill the container, no definite shape.

WWW.MAJORDIFFERENCES.COM

❖ VIDEO-LINKS

<https://www.youtube.com/watch?v=pKvo0XWZtjo>

❖ PPT LINKS

<https://www.slideshare.net/dipanshubharti2/matter-in-our-surrounding-40407655>

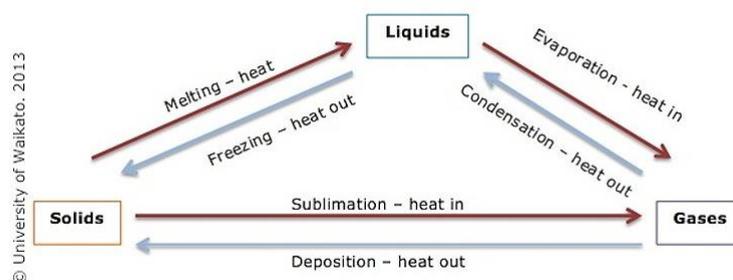
❖ ASSIGNMENT

- 1) Which state of matter has the maximum kinetic energy between its particles ?
- 2) Make a chart of different matters around you. Mention their states and differentiate them on the basis of – rigidity, interparticle space, intermolecular force and kinetic energy between the particles

❖ TEACING MATERIAL

Interchange in states of matter

- Water can exist in three states of matter –
- Solid, as ice,
- Liquid, as the familiar water, and
- Gas, as water vapour.



Sublimation : The changing of solid directly into vapours on heating & vapours into solid on cooling. Ex. Ammonium chloride, camphor & iodine.

(a) Effect of change in temperature

- The temperature effect on heating a solid varies depending on the nature of the solid & the conditions required in bringing the change.
- On increasing the temperature of solids, the kinetic energy of the particles increases which overcomes the forces of attraction between the particles thereby solid melts and is converted to a liquid.
- The temperature at which a solid melts to become a liquid at the atmospheric pressure is called its melting point.
- The melting point of ice is 273.16 K.
- The process of melting, that is, change of solid state into liquid state is also known as fusion.

(b) Effect of Change of Pressure

- Increasing or decreasing the pressure can change the state of matter. Applying pressure and reducing temperature can liquefy gases.
- Solid carbon dioxide is stored under high pressure. Solid carbon dioxide gets converted directly to gaseous state on decrease of pressure to 1 atmosphere without coming into liquid state. This is the reason that solid carbon dioxide is also known as dry ice.

Latent Heat :

- The hidden heat which breaks the force of attraction between the molecules during change of state.

Fusion Heat energy required to change 1kg of solid into liquid.

Vaporisation Heat energy required to change 1kg of liquid to gas at atmospheric pressure at its boiling point.

- Thus, we can say that pressure and temperature determine the state of a substance, whether it will be solid, liquid or gas.

Evaporation & Boiling

- Particles of matter are always moving and are never at rest.
- At a given temperature in any gas, liquid or solid, there are particles with different amounts of kinetic energy.
- In the case of liquids, a small fraction of particles at the surface, having higher kinetic energy, is able to break away from the forces of attraction of other particles and gets converted into vapour .
- This phenomenon of change of a liquid into vapours at any temperature below its boiling point is called evaporation.

❖ VIDEO-LINKS

<https://www.youtube.com/watch?v=ENVKQVIDNLY>

❖ LAB ACTIVITY

<https://www.youtube.com/watch?v=4ueTSxC4zr4>

❖ PPT LINKS

<https://www.slideshare.net/spandanbhattacharya5/inter-conversion-of-states-of-matter>

❖ ASSIGNMENT

- 1) Differentiate between fusion and vaporization.
- 2) Define latent heat.
- 3) Write down some examples from your daily life that shows sublimation .

DAY-5

❖ TEACING MATERIAL

Factors Affecting Evaporation

- The rate of evaporation increases with an increase of surface area.
- With the increase of temperature, more number of particles get enough kinetic energy to go into the vapour state.
- Humidity is the amount of water vapour present in air. The air around us cannot hold more than a definite amount of water vapour at a given temperature. If the amount of water in air is already high, the rate of evaporation decreases.
- Wind speed : the higher the wind speed , the more evaporation.

Evaporation cause cooling.

- The particles of liquid absorb energy from the surrounding to regain the energy lost during evaporation,

Evaporation Vs Boiling

- Boiling is a bulk phenomenon. Particles from the bulk (whole) of the liquid change into vapour state.
- Evaporation is a surface phenomenon. Particles from the surface gain enough energy to overcome the forces of attraction present in the liquid and change into the vapour state.

Kelvin & Celsius Scale

- Kelvin is the SI unit of temperature, = 273.16 K we take = 273 K.
- SI unit of temperature is Kelvin.
- Kelvin scale of temperature has always positive sign , hence regarded as better scale than Celsius.
- Atmosphere (atm) is a unit of measuring pressure exerted by a gas. The SI unit of pressure is Pascal (Pa):
- 1 atmosphere = $1.01 \times (10 \text{ to the power } 5) \text{ Pa}$. The pressure of air in atmosphere is called atmospheric pressure. The atmospheric pressure at sea level is 1 atmosphere, and is taken as the normal atmospheric pressure.

❖ VIDEO-LINKS

https://www.youtube.com/watch?v=UUm_ZAa8z6k

❖ EXERCISE

<https://www.learnbse.in/ncert-solutions-for-class-9-science-matter-in-our-surroundings/>

❖ LAB MANUALS

<http://www.ncert.nic.in/exemplar/labmanuals.html>

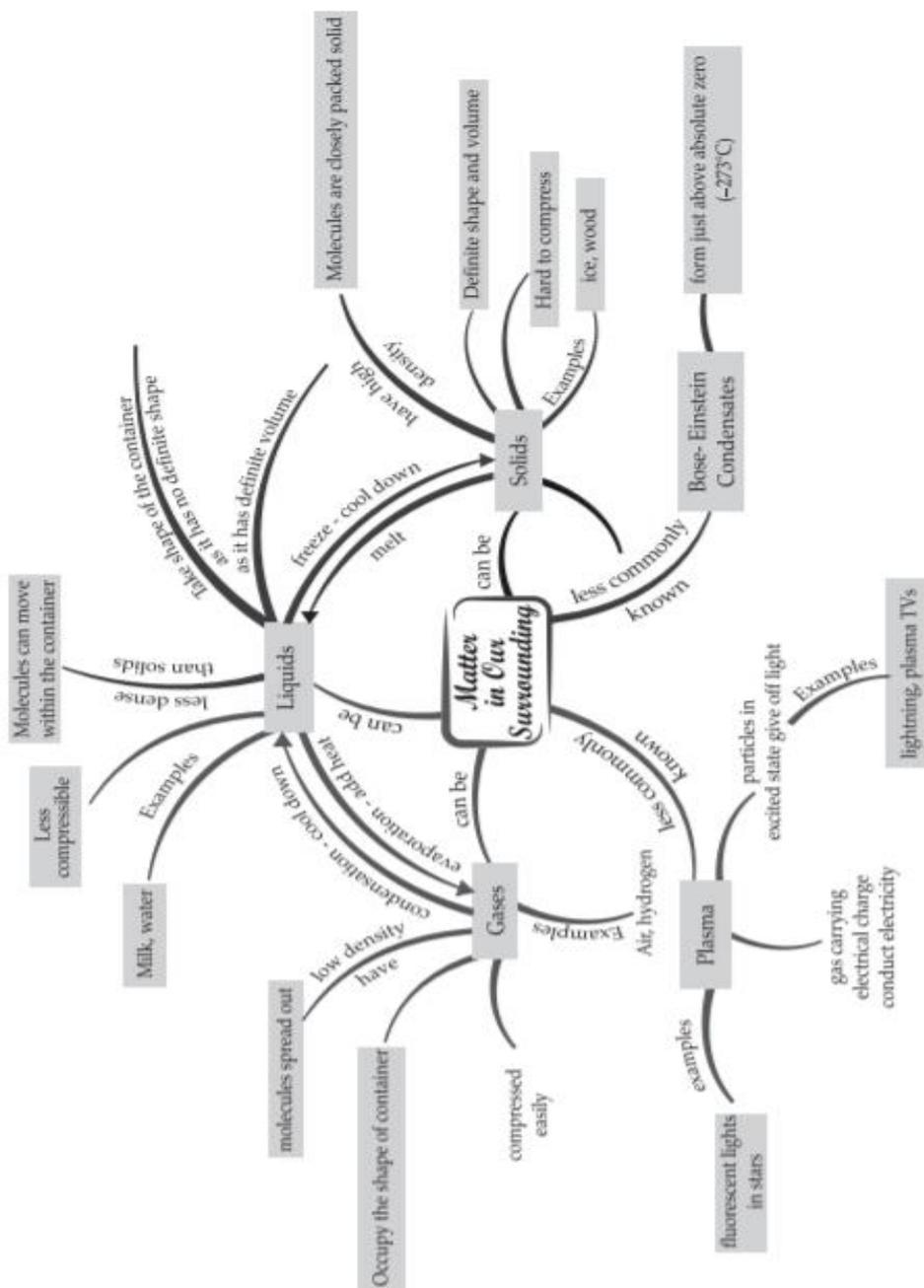
<http://ncert.nic.in/ncerts/l/ielm102.pdf>

❖ CONCEPT MAPS

<https://www.mindmeister.com/988999603/matter>

<https://www.mindmeister.com/974292876/what-are-the-differences-between-pure-substances-and-a-mixture>

MIND MAP : LEARNING MADE SIMPLE Chapter-1



https://www.oswaalbooks.com/download/freeresources/class9/256Science-9_Mind%20Maps.pdf