Chapter-7

WATER

STUDY NOTES

The most important natural resource is the water.

Living beings may survive a few days without food but not without water.

Sources of water:

About 97% of water is present in sea and ocean.

And remaining 3% of the earth's water, is available as fresh water.

The sources of water can be divided into two groups:

Surface water and Ground water

Surface Water: It is present on the surface of the earth.

Sources of these are as follows:

1. **Rain** is formed by condensation of water vapor, hence is the purest form. Rain falls, water get impure when water sticks to dust particles and dissolve with numerous gas from atmosphere. Impurities includes , 0.005% solid impurities along with gases such as sulphur dioxide, nitrogen dioxide and ammonia.
2. **Ocean and sea water** :The largest amount of water is present in the ocean, but it is most impure form of water. Nearly 3.5% of dissolved matter out of 2.7% is common salt. Because of saltiness it cannot be used in home and agriculture.
3. **River water**: Water from rains and melted glaciers flow along the surfaces of the earth along with spring water is consider as river water. Clay, straw and sand, bacteria remain suspended in the water makes it

muddy. Type of bed on which river water passes also plays important role in the nature of water.

4. **Lake**: Deep and large hollows of water on the earth called as lakes. They get water from rains, rivers and springs.
5. **Pond water**: Rain water is collected in small and shallow hollows on the surface termed as ponds. This water also contains both dissolved and suspended impurities.

Underground water:

Water which get percolates through the upper layer of the earth's surface and is collected on the solid rocks underground is called underground water.

Many germs and impurities may be present in it which makes it unfit for drinking and cooking purpose.

1.**Spring water**: this water is free from organic impurities but contain lots of minerals such as soluble salts of sodium, potassium, calcium etc along with soluble gases which develops taste to it.

2. **Well water**: this water contains CO2, and minerals salt dissolved in it. This water is used for irrigation and drinking purpose. Tube wells are very common nowadays

Three states of water and there inter conversions:

- Water present into three sates solid that is ice, liquid that is simply natural water and its vapors which are in gaseous state.
- On application of heat, state changes as molecule acquires the energy which brings inter conversions.
- On heating ice melts to form water and on further heating it forms vapors.

•On cooling of vapors that is condensation brings the molecule back together and forms liquid water on further cooling water transformed in solid ice.

Water cycle:

The water cycle is described as the cyclic movement of water from the atmosphere to the Earth and back to the atmosphere through various processes.

Different steps include in these are cycle include evaporation, transpiration, condensation, precipitation and surface run-off.

(a)Evaporation–Due to sun's heat the water present on the surface of oceans evaporates. This process of conversion of water from liquid state to vapor state is called evaporation. It is also takes place from wet clothes, fields, ponds, lakes and rivers.

(**b) Transpiration** -. Plant release excess water into air in the form of water vapor by the process of transpiration.

(c)Condensation-The evaporated water is carried away by warm air. On reaching to higher from the surface of the Earth, it starts to cool down, condenses to form tiny water droplets which float in air to form clouds or fog.

(d) Precipitation-By the process of precipitation, bigger water drops come down to form rain by the process of precipitation. The water drops can become snow or hail on basis of coldness of air and may settle on the top of a mountain. When these snow or hail melts, they can become part of a river or a stream.

(e) Surface run-off–Most of the rain water flows down the hills and mountains to collect into rivers, lakes or streams and get absorbed into ground level. Rain also washes away the topmost layer of the soil into water bodies. This circulation or repeated process of water through all these different factors is called as water cycle.

Importance of water:

- Water is the medium through which all essential vitamins and minerals are transported in the bodies of living organisms.
- It maintains body temperature in plants and animals. In order to decrease the temperature in their bodies, animals lose water via perspiration (sweating) and plants lose water via transpiration.
- Water is an integral part of photosynthesis. Autotrophic plants cannot perform their process without absorbing water from roots will eventually react to leaf.
- Water is as a habitat for more than 50% of all life on Earth.
- Water helps improve the circulation of oxygen throughout the human body.
- It also plays a crucial role in the complete digestion of food.
- Water bodies are used for transportation purposes as well
- Spreading of plants seedlings are carried out by flowing water as transporting from one place to another.
- Fishing can be incorporated as business those who stays near the water bodies.
- Fast movement of water possess the kinetic energy which is use sometime to turn the turbine, generates electricity .

Portable water:

- The water suitable for drinking by human beings termed as portable water.
- Every source as we discus is not suitable for drinking water as may contain impurities.
- Filtration should be carry out to remove suspended particles and microorganisms killed before it reaches the municipal water supply.

Otherwise common diseases such as diarrhoea and gastroenteritis can be caused.

- Water born diseases :The chemicals and microbes present in water may cause diseases known as water-borne diseases.

Diarrhoea:

Frequent loose motion and infection in intestine are the characteristics. Which result in loss of water in body

Typhoid:

Bacterium present in drinking water causes this which result in fever for long period.

Jaundice:

Hepatitis affects the liver leading to nausea, weight loss, and stomach pain.

Cholera: frequent vomiting may turn to fatal.

Gastroenteritis: pain in stomach with loose motion.

Dysentery: amoeba infects the intestinal wall which causes acute stomach pain may be with bleeding as excessive mucus secretion along with loose motions.

Purification of natural water:As water obtained from sources is not always portable. The purification process is carried out to make it fit for drinking. Which includes following

•**Sedimentation and Decantation**:

Water is allow to stand for while which make the all impurities to get settle down. This water after this sedimentation send to loading tank

•**Loading:** To ensure all the impurities get settle down , certain chemicals such as alum are added.

•**Filtration:** Layers of fine sand, gravel and charcoal used for filtration.

All the suspended particle now get removed off.

•**Destroying germ**: Sterilization takes place by adding bleaching powder. The boiling of water is also sometimes performed to kill microbes.

•**Storage:** The water before supply stored in storage tanks

Water-The Universal Solvent:

- Solute dissolves in solvent forms solution.
- In solution the amount of solvent is at larger extent as compared to solute .
- Any substance in water is known as aqueous solution.

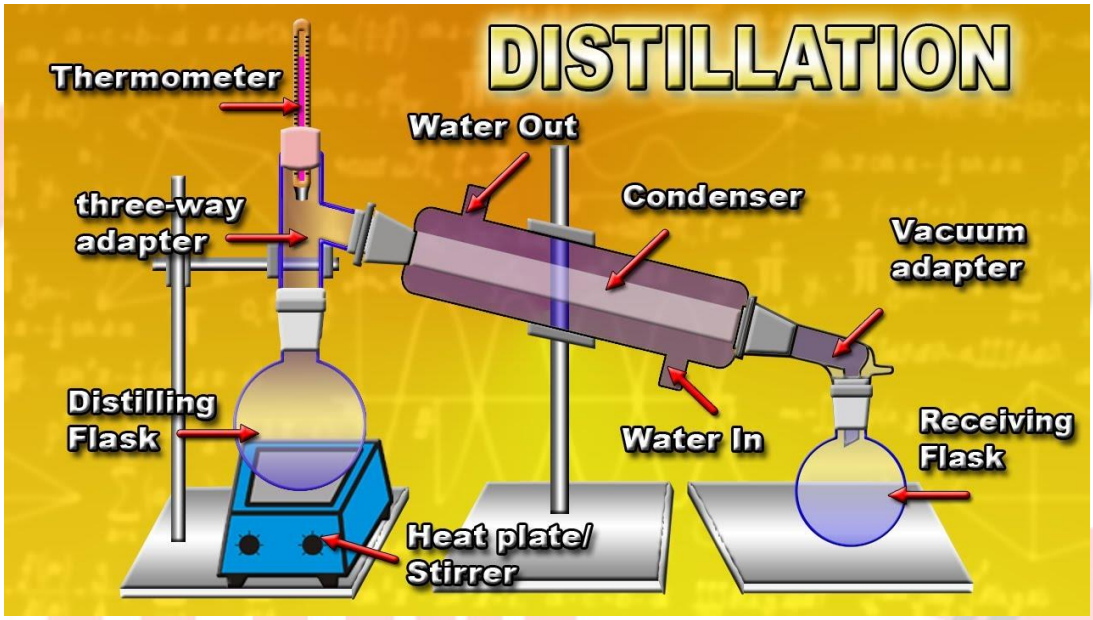
Saturated and Unsaturated solution:

A solution which cannot dissolve any more solute into it at a particular temperature is termed as “saturated solution”.

A solution type which take up more solute at a given temperature is called as “Unsaturated solution”.

Salinity of sea:

- In sea water many impurities along with heavy minerals are present, which make it totally unfit for drinking purpose.
- The amount of sodium chloride commonly called as common salt is at greater extent in sea water.
- This salt water is purified by process known as distillation.
- As sea water is present at great amount, there is large scale distillation plants, boilers are used in place of burner and condensing coils are used for cooling in place of condenser.



Water pollution:

•**Domestic sewage** :Domestic sewage is waste water from our homes, contains many dissolved and suspended impurities. People dump their garbage into streams, lakes, rivers and seas, results in polluting the water with cans, bottles, plastics and household waste.

•**Pollution caused by industrial and agricultural operations**

- Agricultural or irrigation run-off has a high nitrate content due to extensive use of fertilizers and pesticides.
- As the water seeps into the ground, it greatly affects the groundwater quality, leading to pollute it. In case of industries as oil refineries, paper factories, and textile and sugar mills, discharge their toxic chemical wastes into the river make

•**Pollution due to chemicals**

- Chemical contamination of water due to chemicals, such as compounds of arsenic , fluorides and lead, cause plants and animals to die.

- The soil is also affected by polluted water, causing changes in its acidity, and, therefore, the growth of plant life. Polluted water is unsuitable for drinking, recreation, agriculture and industry.
- The large quantities of chemicals that are washed in from the fields are responsible for the excessive growth of algae. Once the algae die, it serves as a food for bacteria. As a result, a lot of oxygen in the water is used up and many aquatic organisms die.

Thermal pollution

Thermoelectric plants release large amount of hot water along with chemically active pollutants n lakes and rivers.

This hot water is fasten the rapid growth of algae. Once the algae die, it serves as a food for bacteria.

As a result, a lot of oxygen in the water is used up and many aquatic organisms die.

This type of pollution is called thermal pollution.

Methods of preserving pollution:

1. The sewage should be treated fist before it release into river or any water bodies

2.The polluted water from industries firstly undergo through effluent treatment and then only allow to pass out.

3. Instead of using fertilizers farmer promote organic farming.

4. Trees and plants may be planted along the river banks

5. Bathing and cleaning of animal near any water source should be avoided

6. Defecation in open field should be avoided by promoting healthy hygiene.

7. Human and animal excreta should be prevented from mixing in water by building pit latrines and treating sewage properly before putting it in river.

Need to conserve water:

Already we lack portable drinking water, so wastage is highly prohibited.

So it is important and essential to conserve water.

1. Rain water harvesting is best way to conserve and store natural water.

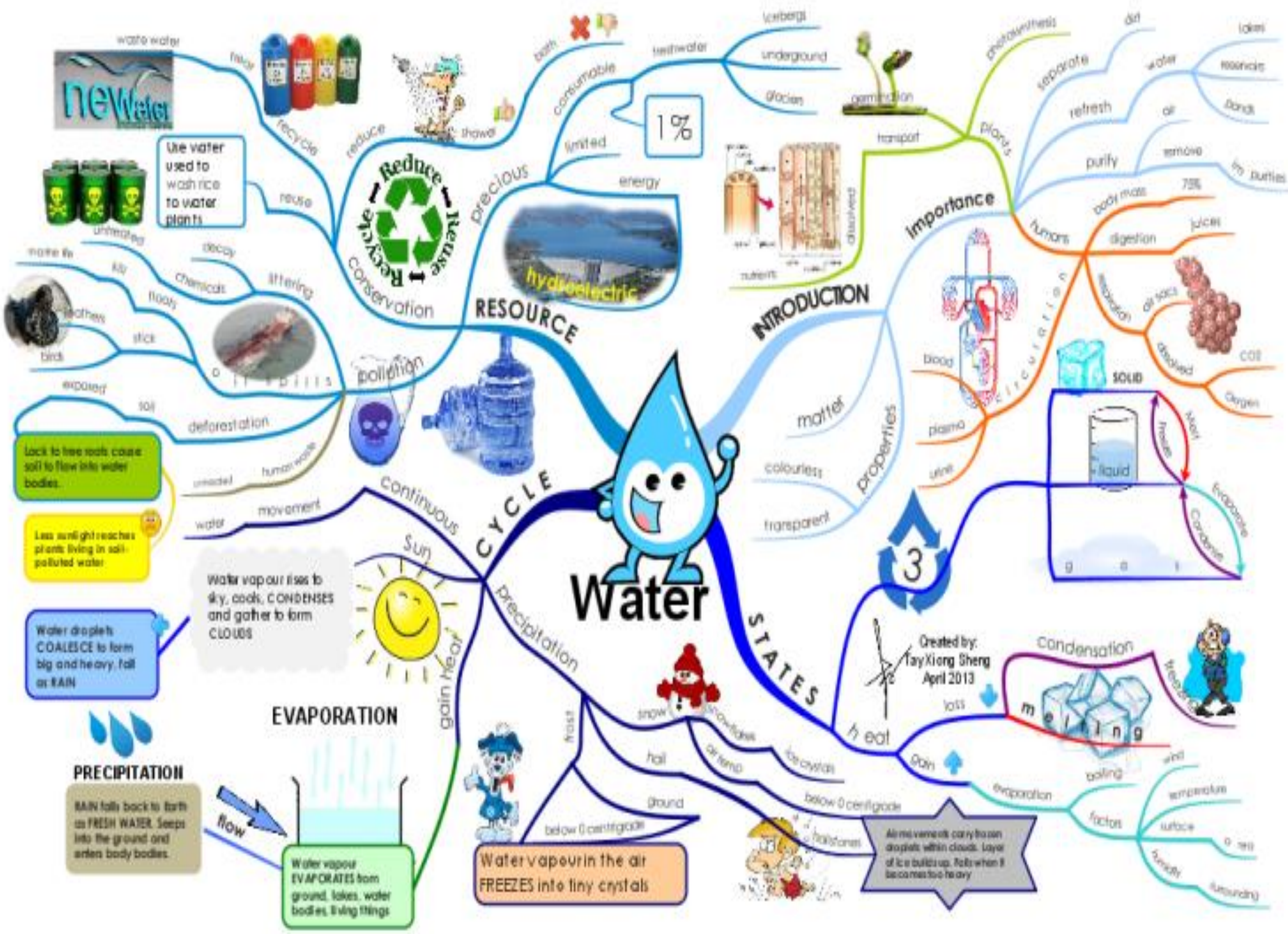
2. Plantation of trees should be done

3. Method of water pollution preservation must be adopted.

4. At individual level, avoid wastage of water in simple steps.

5. Awareness programs should be carry out to promote conservation of water.

CONCEPT MAP-


Water
RESOURCE
INTRODUCTION
CYCLE
STATES
conservation
precious
pollution
importance
properties
matter
colourless
transparent
continuous
Sun
precipitation
gain heat
heat
gain
loss
condensation
melting
evaporation
factors
boiling
freshwater
icebergs
underground
glaciers
consumable
limited
energy
1%
hydroelectric
Reduce
Reuse
Recycle
reduce
recycle
reuse
waste water
deforestation
movement
water
snow
hail
ground
below 0 centigrade
SOLID
liquid
Use water used to wash rice to water plants
Lack of tree roots cause soil to flow into water bodies.
Less sunlight reaches plants living in soil-polluted water
Water vapour rises to sky, cools, CONDENSES and gather to form CLOUDS
Water droplets COALESCE to form big and heavy, fall as RAIN
EVAPORATION
PRECIPITATION
RAIN falls back to Earth as FRESH WATER. Seeps into the ground and enters body bodies.
flow
Water vapour EVAPORATES from ground, lakes, water bodies, living things
Water vapour in the air FREEZES into tiny crystals
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