Water is an inorganic compound with the chemical formula H_2O. It is a transparent, tasteless, odorless,[c] and nearly colorless chemical substance. It is the main constituent of Earth's streams, lakes, and oceans and the fluids of all known living organisms, in which it acts as a solvent. Water, being a polar molecule, undergoes strong intermolecular hydrogen bonding which is a large contributor to its physical and chemical properties. It is vital for all known forms of life, despite not providing food energy or being an organic micronutrient. Due to its presence in all organisms, its chemical stability, its worldwide abundance, and its strong polarity relative to its small molecular size, water is often referred to as the "universal solvent".

Because Earth's surface temperature and pressure is relatively close to water's triple point, water exists on Earth as a solid, a liquid, and a gas. It forms precipitation in the form of rain and aerosols in the form of fog. Clouds consist of suspended droplets of water and ice, its solid state. When finely divided, crystalline ice may precipitate in the form of snow. The gaseous state of water is steam or water vapor. The other two common states of matter of water are the solid phase, which is ice, and the gaseous phase, water vapor or steam. The addition or removal of heat can cause phase transitions: freezing (water to ice), melting (ice to water), vaporization (water to vapor), condensation (vapor to water), sublimation (ice to vapor) and deposition (vapor to ice).

Water cycle

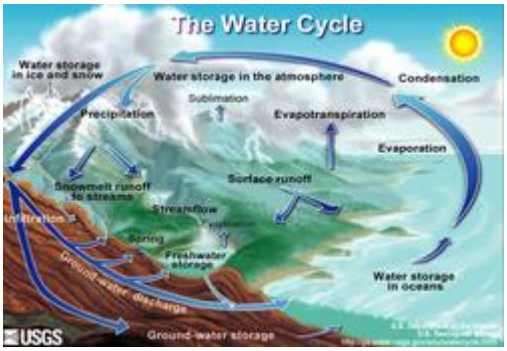

Figure:Water cycle

The water cycle (known scientifically as the hydrologic cycle) is the continuous exchange of water within the hydrosphere, between the atmosphere, soil water, surface water, groundwater, and plants.

Water moves perpetually through each of these regions in the *water cycle* consisting of the following transfer processes:

- evaporation from oceans and other water bodies into the air and transpiration from land plants and animals into the air.
- precipitation, from water vapor condensing from the air and falling to the earth or ocean.
- runoff from the land usually reaching the sea.

Most water vapors found mostly in the ocean returns to it, but winds carry water vapor over land at the same rate as runoff into the sea, about 47 Tt per year while evaporation and transpiration happening in land masses also contribute another 72 Tt per year. Precipitation, at a rate of 119 Tt per year over land, has several forms: most commonly rain, snow, and hail, with some contribution from fog and dew. Dew is small drops of water that are condensed when a high density of water vapor meets a cool surface. Dew usually forms in the morning when the temperature is the lowest, just before sunrise and when the temperature of the earth's surface starts to increase. Condensed water in the air may also refract sunlight to produce rainbows.

Water runoff often collects over watersheds flowing into rivers. Through erosion, runoff shapes the environment creating river valleys and deltas which provide rich soil and level ground for the establishment of population centers. A flood occurs when an area of land, usually low-lying, is covered with water which occurs when a river overflows its banks or a storm surge happens. On the other hand, drought is an extended period of months or years when a region notes a deficiency in its water supply. This occurs when a region receives consistently below average precipitation either due to its topography or due to its location in terms of latitude.

Water as Universal Solvent

- Water dissolves more substances than any other liquid because of its polarity and molecular charges.
- Water's polarity helps it break ionic bonds, as seen when salt dissolves in water.
- Despite its name, water doesn't dissolve everything, especially nonpolar molecules and some compounds with strong ionic bonds.

Water is called the universal solvent because more substances dissolve in water than in any other chemical. This has to do with the polarity of each water molecule. The hydrogen side of each water (H_2O) molecule carries a slight positive electric charge, while the oxygen side carries a slight negative electric charge. This helps water dissociate ionic compounds into their positive and negative ions. The positive part of an ionic compound is attracted to the oxygen side of water while the negative portion of the compound is attracted to the hydrogen side of the water.

Why Salt Dissolves in Water

For example, consider what happens when salt dissolves in water. Salt is sodium chloride, NaCl. The sodium portion of the compounds carries a positive charge, while the chlorine part carries a negative charge. The two ions are connected by an ionic bond. The hydrogen and oxygen in the water, on the other hand, are connected by covalent bonds. Hydrogen and oxygen atoms from different water molecules are also connected via hydrogen bonds. When salt is mixed with water, the water molecules orient so that the negative charge oxygen anions face the sodium ion, while the positive-charged hydrogen cations face the chloride ion. Although ionic bonds are strong, the net effect of the polarity of all the water molecules is enough to pull

the sodium and chlorine atoms apart. Once the salt is pulled apart, its ions become evenly distributed, forming a homogeneous solution.

- If a lot of salt is mixed with water, it won't all dissolve. In this situation, dissolution proceeds until there are too many sodium and chlorine ions in the mixture for water to win the tug-of-war with undissolved salt. The ions get in the way and prevent the water molecules from completely surrounding the sodium chloride compound. Raising the temperature increases the kinetic energy of the particles, increasing the amount of salt that can be dissolved in the water.

Water Doesn't Dissolve Everything

- Despite its name as the "universal solvent" there are many compounds water won't dissolve or won't dissolve well. If the attraction is high between the oppositely charged ions in a compound, then the solubility will be low. For example, most of the hydroxides exhibit low solubility in water. Also, nonpolar molecules don't dissolve very well in water, including many organic compounds, such as fats and waxes.