

1. Most of the liquids found in human body including blood, lymph and urine are solutions.
2. A solution is a homogeneous mixture of two or more substances. Ex: Sugar Solution
3. The component, which is present in a larger amount is called solvent.
4. The process of uniform distribution of solute into solvent is called dissolution.
5. Copper sulphate contains two components i.e one solute - copper sulphate and one solvent - water. So it is a binary solution.
6. Most of the substances are soluble in water. So, water is called 'Universal solvent'.
7. The solution in which any liquid, other than water, acts as a solvent is called non-aqueous solvent.
8. Examples for non-aqueous solutions: Sulphur dissolved in Carbondisulphide, Iodine dissolved in carbon tetrachloride.
9. 36g of sodium chloride in 100g of water at 25°C forms saturated solution.
10. 10g or 20g or 30g of sodium chloride in 100g of water at 25°C forms an unsaturated solution.
11. Super saturated solutions are unstable, and the solute is reappearing as crystals when the solution is disturbed.
12. Common salt is a polar compound and dissolves readily in polar solvent like water.
13. In endothermic process, solubility increases with increase in temperature.
14. In exothermic process, solubility decreases with increase in temperature.
15. Solubility of gases in liquid decrease with increase in temperature.
16. The effect of pressure on the solubility of a gas in liquid is given by Henry's law.
17. 5% sugar solution means 5g of sugar in 95g of water.
18. Volume percentage decreases with increase in temperature, because of expansion of liquid.
19. The molecular formula of Blue vitriol is $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.

20. IUPAC name of Gypsum is Calcium Sulphate dihydrate.
21. Common name of Magnesium sulphate heptahydrate is Epsom salt.
22. The number of water molecules in white vitriol is 7.
23. Hygroscopic substances are used as drying agents.
24. Anhydrous calcium chloride is an example for hygroscopy.
25. Hygroscopic substances may be amorphous solids or liquids.
26. Deliquescent substances lose their crystalline shape and ultimately dissolve in the absorbed water forming a saturated solution.
27. Calcium chloride, Caustic Soda, Caustic potash are some examples of deliquescent substances.
28. The water of crystallisation of Green vitriol is 7.
29. On heating blue vitriol changes its colour from blue to white.
30. On exposure to air the physical state of hygroscopic substances do not state.
31. On exposure to air the physical state of deliquescent substances change.
32. Deliquescence is maximum when the atmosphere is humid.
33. To prepare a saturated solution of glucose, the amount of glucose that should be dissolved in 100ml of water is 91g.
34. When water is boiled, bubbles are formed due to the evolution of dissolved oxygen.
35. 5g of a salt dissolved in 20g of water to form a saturated solution at 60°C. Then the solubility of the salt at this temperature is 25g.
36. The solubility of salt at 30° is 50g. The weight of water required to prepare a saturated solution containing 90g of salt is 180g.
37. When 100g of a saturated solution is evaporated at 50°C, 50g of solid is left over. Then the solubility of the substance at 50° c is 100g.
38. If 50ml of a liquid solute is dissolved in 500ml of liquid solvent, then its % by volume (v/v) is 9.09ml.
39. 10 grams of a solute dissolved in 90grams of a solvent. Its mass percent in solutions is 10grams.
40. Reaction of calcium oxide with water is an exothermic reaction.

UNIT-10 TYPES OF CHEMICAL REACTIONS

1. A chemical change is a change in which one or more new substances are formed.

- Bond breaking absorbs energy whereas bond formation releases energy.
- The compounds or elements which undergo reactions (Reactants) are shown to the left of the arrow.
- Aerobic: Presence of Oxygen.
Anerobic: Absence of Oxygen
- A combination reaction is a reaction in which two or more reactants combine to form a compound. It is otherwise called as synthesis or composition reaction. Most combination reactions are Exothermic".
- In Decomposition reaction, a single compound splits into two or three simpler substances under suitable condition.
- There are three main classes of decomposition.
 - Thermal decomposition: Heat is supplied to break the bonds. So it is called Endothermic reaction.
 - Electrolytic Decomposition Reactions:
Electrical Energy is used to bring about the reaction. This process is termed as 'Electrolysis'.
 - Photo decomposition Reactions:
As the decomposition is caused by light, this kind of reaction is also called 'photolysis'. All photo decomposition reactions are "Endothermic".
- Single displacement Reactions: It is a reaction between an element and a compound when they react, one of the elements of the compound reactant is replaced by the element -reactant to form a new compound and an element.

$$\begin{array}{ccccccc} \text{A} & + & \text{BC} & \longrightarrow & \text{AC} & + & \text{B} \\ \text{element} & & \text{compound} & & \text{compound} & & \text{element} \end{array}$$
- Double displacement Reactions: When two compounds react, if their ions are interchanged, then the reaction is called double displacement reaction or Metathesis reaction.

$$\text{AB} + \text{CD} \longrightarrow \text{AD} + \text{CB}$$
- Major classes of double displacement reaction
 - Precipitation Reactions: When aqueous solutions of two compounds are mixed, if they react to form an insoluble compound and a soluble compound then it is called "Precipitation reaction".
 - Neutralization Reaction: It is another type of displacement reaction in which the acid reacts with the base to form a salt and water. Neutralisation prevents tooth decay.
- Combustion Reaction: A combustion reaction is one in which the reactant rapidly combines with oxygen to form one or more oxides and energy (Heat) so combustion is called an exothermic reaction.
- A reversible reaction is a reaction that can be reversed i.e the products can be converted back to the reactants.
- Reaction that cannot be reversed is called irreversible reaction.
- Chemical Equilibrium is state of a reversible chemical reaction in which no change in the amount of the reactants and products takes place.
Rate of forward Reaction - Rate of backward Reaction
- The product of the concentration of the hydronium ion and the hydroxyl ion is called ionic product of water. It is denoted by Kw. Its unit is mol² dm⁻⁶.
- The p^H is the negative logarithm of the hydrogen ion concentration,
$$\text{P}^{\text{H}} = -\log_{10} (\text{H}^+)$$
- p^H of the stomach fluid is approximately 2.0.
- p^H of the saliva normally ranges between 6.5+07.5
- Citrus fruits require slightly alkaline soil. Rice requires acidic soil and sugarcane requires neutral soil.
- p^H of rain water is approximately 7. If p^H of rain water is below 5-6 its called Acid rain.
- In human body all biochemical reactions take place between the p^H value of 7.0 to 7.8.
- Most reaction in chemistry are irreversible reactions.
- Equilibrium is possible in a closed system.
- Temperature increases the reaction rate.
- Pure water is a weak electrolyte.
- The chemical formula for marble is CaCO₃
- A catalyst is a substance which increases the reaction rate without being consumed in the reaction.
- The Ideal p^H for blood is 7.4. Any increase or decrease in this value leads to diseases.
- p^H Scale is a Scale for measuring the hydrogen ion concentration in a solution. P in p^H stands for 'Potenz' in German meaning 'power'.
- p^H notation was devised by the Danish Biochemist Sorenson in 1909. p^H scale is a set of numbers from 0 to 14.
- Acids have p^H lesser than 7
Bases have p^H greater than 7
A neutral solution has p^H equal to 7.
- Food kept at room temperature spoils faster than that kept in the refrigerator. In the refrigerator, the temperature is lower than the room temperature and hence the reaction rate is less.

PHYSICS

UNIT - 3 THERMAL PHYSICS

- Heat energy always flows from one body to the other due to a temperature difference between them.
- The process in which heat energy flows from a body at a higher temperature to another object at lower temperature is known as heating.
- The process of transmission of heat may be done in any of the ways like conduction, convection or radiation.
- The SI unit of heat energy absorbed or evolved is Joule (J).
- During the process of transferring heat energy, the body at lower temperature is heated while the body at higher temperature is cooled.
- The rise in temperature depends on the nature and mass of the substance.
- All forms of matter (solid, liquid, Gas) undergo expansion on heating.
- For a given change in temperature the extent of expansion is smaller in solids than in liquids and gases.
- The different types of expansion of solid are, 1) Linear expansion 2) superficial expansion 3) cubical expansion
- Its boiling point of water is 95°F , the reading in Kelvin scale is 308K [Formula: $(\text{F}+460) \times \frac{5}{9}$]
- A metal rod 6.522m long of 285kg expands by 6.576m at 363K . The coefficient of linear expansion of the metal rod is $1.06 \times 10^{-4}\text{K}^{-1}$.
- All the substances will undergo the following changes like increase in temperature, expansion of substance, change of state when heated.
- Conversion Formula:
 - Celsius to Fahrenheit $\Rightarrow ^{\circ}\text{F} = \frac{9}{5} (^{\circ}\text{C}) + 32$
 - Fahrenheit to Celsius $\Rightarrow ^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F}-32)$
- At -40° temperature, Celsius and Fahrenheit scales are same.
- Thermal conduction in metal is due to vibration of atoms.
- According to Avagadro's law, the volume of gas is directly proportional to number of atoms.
- Avagadro's number (N_A) is the total number of atoms per mole of the substance. It is equal to $6.023 \times 10^{23}/\text{mol}$.
- For any exchange of heat, Heat gained = Heat lost
- A cooking pot is coated black because black substances absorb more heat.
- A cold steel spoon is dipped in a cup of hot milk, It transfers heat to its other end by the process of conduction.
- When heat transfers by the process of Radiation no medium is required.
- If an iron ball at 40°C is dropped in a mug containing water at 40°C . The heat will not flow from iron ball to water or from water to iron ball.
- In a pressure cooker, cooking is faster because the increase in vapour pressure increase the boiling point.
- Body A of mass 2kg and another body B of mass 4kg and of same material are kept in the same sunshine for some interval of time. If the rise in temperature is equal for both the bodies then, Heat absorbed by B is double because its mass is doubled.
- The real expansion is always more than that of apparent expansion.
- The ideal gas equation relates all the properties of an ideal gas.
- At very high temperature or low pressure a real gas behaves as an ideal gas.
- Convert 100°C into K
 - $(273+100)\text{K} = 373\text{K}$
 - Convert 23K into $^{\circ}\text{C}$
$$\text{T}^{\circ}\text{C} = \text{K}-273$$
$$= 23-273$$
$$= -250^{\circ}\text{C}$$
- An aluminium sheet of length 30m is made into cone for temperature range $\Delta\text{T}=300\text{K}$.
The change in length of Aluminium sheet is 0.207m .
(coefficient of linear expansion of Aluminium = $23 \times 10^{-6}\text{K}^{-1}$).
- If the atoms or molecules of a gas do not interact with each other, then the gas is said to be an Ideal gas.

BIOLOGY

Ch-15 Nervous System

- Coordination: When various organs work together in a systematic, controlled and efficient way to produce proper response to various stimuli is called co-ordination.

2. Homeostasis: In animals including human, the co-ordination between various cells and organs is essential for their diverse activities to maintain physiological balance called Homeostasis.
3. * Stimulus refers to the changes in the environmental conditions, that are detected by receptors present in the body.
* Responses (or) Reactions refers to the relevant changes in the activities of organisms to a particular stimuli.
4. Neuron/Nerve cell is the structural and functional unit of the nervous system. It is the longest cell of the human body with a length of over $100\mu\text{m}$.
5. Neuroglia (or) glial cells are non-exciting supporting cell of nervous system that do not initiate or conduct nerve impulses.
6. Structure of Neuron
 - * A neuron consists of cyton, dendrites and axon.
 - I. * Cyton is also called cellbody or perikaryon.
* Cyton has a central nucleus with abundant cytoplasm called Neuroplasm.
* The cytoplasm has large granular body called Nissl's granules.
* Neurons do not have the ability to divide.
 - II. * Dendrites project from the surface of the cell body, conducts nerve impulses towards cyton.
 - III. * Axon is a single, elongated slender projection.
* The end of axon terminates as fine branches which terminates into Knob-like swelling called synaptic knobs.
* The plasma membrane of axon is called axolemma, and the cytoplasm is called axoplasm.
* Axons are covered by protective sheath called myelin sheath, covered by layer of Schwann cells called neurilemma. Myelin sheath breaks at intervals by depressions called Nodes of Ranvier.
* The region between the nodes is called as internode. Myelin sheath acts as an insulator and ensures rapid transmission of nerve impulses.
7. Types of neurons: Neurons may be of different types based on structure and functions.
Structurally neurons are classified into three types namely:
 - i) Unipolar neurons: Only one nerve process arises from cyton, which acts as both axon and dendron.
Eg: Found in early embryos but not in adult.

- ii) Bipolar neurons: Cyton gives rise to two nerve processes, in which one acts as an axon, while another as a dendron.
Eg: Found in retina of eye and olfactory epithelium of nasal chambers.
- iii) Multipolar neurons: Cyton gives rise to many dendrons and an axon.
Eg: Found in the cerebral cortex of brain.
Functionally neurons are categorised as:
 - i) Sensory or afferent neurons: Carries impulse from sense organ to central nervous system.
 - ii) Motor or Efferent neurons:
Carries impulse from central nervous system to effectors organ such as muscle fibre or gland.
 - iii) Association neurons conducts impulses between sensory and motor neurons.
8. Synaptic transmission: The flow of nerve impulses from axonal end of one neuron to dendrite of another neuron through a synapse is called synaptic transmission.
* Each neuron can transmit 1,000 nerve impulses per second, and make as many as ten thousands of synaptic contacts with other neurons.
9. Neurotransmitters are the chemicals which allows the transmission of nerve impulse from the axon terminal of one neuron to the Dendron of other neuron or to an effector organ.
* The important neurotransmitter released by neurons is called Acetylcholine.
10. Human Nervous system is differentiated into:
 - i) Central Nervous System (CNS),
 - ii) Peripheral Nervous System (PNS) and
 - iii) Autonomic Nervous System (ANS)
11. i) Central Nervous System (CNS): The brain and the spinal cord are delicate vital structures, well protected in bony cavities of the skull and the vertebral column.
12. * Meninges: Brain is covered by three connective tissue membranes collectively known as Meninges.
 - i) Duramater: It is the outermost thick fibrous membrane
 - ii) Arachnoid membrane: It is the middle, thin vascular membrane providing web-like cushion.
 - iii) Piamater: It is the innermost thin delicate membrane

- richly supplied with blood.
13. * Meningitis:
 - * It is the inflammation of meninges.
 - * It occurs when fluid surrounding the meninges become infected.
 - * The most common causes of meningitis are viral and bacterial infections.
 14. Human Brain: It is divided into
 - (i) Forebrain, ii) Mid brain iii) Hindbrain
 15. Forebrain: It is formed of cerebrum and Diencephalon.
 16. * Cerebrum:
 - It comprises of two-third portion of the brain.
 - 2) Right left cerebral hemispheres are divided by deep cleft called Median cleft.
 - Two cerebral hemispheres are interconnected by thick band of nerve fibres called corpus callosum.
 - Cerebrum is responsible for thinking, intelligence, consciousness, memory, reasoning, etc.,
 17. * Diencephalon: It includes Thalamus & Hypothalamus.
 - # Thalamus: It is the major conducting centre for sensory and motor signalling.
 - # Hypothalamus: Found at the base of thalamus.
 - It controls involuntary functions like sweating, blood pressure, etc.,
 - Hypothalamus acts as a thermoregulatory centre of the body.
 18. ii) Midbrain
 - Located between thalamus and hindbrain.
 - Dorsal portion of midbrain comprises of four rounded bodies called corpora quadrigemina, that controls visual and auditory reflexes.
 - iii) Hindbrain: It is formed of three parts namely cerebellum, pons and medulla oblongata.
 20. * Cerebellum:
 - Second largest portion of the brain.
 - Co-ordinates voluntary movements and maintains body balance.
 21. * Pons:
 - Its a latin word meaning bridge.
 - It controls sleep and respiration cycle.
 22. * Medulla oblongata:
 - Posterior most part of the brain
 - It has cardiac centres, respiratory centres, vasomotor centres to control heart beat, respiration and contraction of blood vessels.
 - It regulates vomiting and salivation.
 23. Spinal Cord:
 - It lies in the neural canal of the vertebral column.
 - Spinal cord conducts sensory and motor impulses to and from the brain.
 - It also controls reflex action of the body.
 24. Electro Encephalo Gram (EEG) is an instrument which records the electrical impulses of brain. It helps to diagnose seizures, epilepsy, brain tumors, head injuries, etc.,
 25. Cerebro spinal fluid (CSF):
 - Brain is suspended in a special fluid environment called Cerebro spinal fluid (CSF). It also fills the central canal of the spinal cord.
 - It supplies nutrients to the brain.
 26. Reflex action:
 - * A reflex is any response that occurs automatically without consciousness.
 - * Since the reflex actions are monitored and controlled by the spinal cord, it is also known as spinal reflexes.
 - * The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.
 27. ii) Peripheral Nervous System:
 - It comprises of cranial nerves and spinal nerves.
 - Nerves arising from brain is called cranial nerves.
 - Nerves arising from spinal cord is called spinal nerves.
 - In Man, there are 12 pairs of cranial nerves and 31 pairs of spinal nerves.
 28. iii) Autonomic Nervous System:
 - Also called visceral nervous system
 - It includes sympathetic nerves and parasympathetic nerves.
 - It controls involuntary functions of the visceral organs.