

CHART - 2 > Definitions, Terms & Processes

CHAPTER 1 - MATTER AND ITS COMPOSITION

Melting	Process of change from – solid state to a liquid state at a particular temperature.
Solidification	Process of change from – liquid state to solid state at a particular temperature.
Vaporization	Process of change from – liquid state to a gaseous [vapour] state.
Condensation	Process of change from – gaseous state to liquid state without any fall in temperature.
Sublimation	Process due to which – a solid directly changes to gaseous state [vapour state] & on cooling directly changes back to solid state without changing into liquid state.

CHAPTER 2 - STUDY OF GAS LAWS

Boyle's Law	Temperature remaining constant – the volume of a given mass of dry gas is inversely proportional to it's pressure.
Charle's Law	Pressure remaining constant – the volume of a given mass of a dry gas – is directly proportional to it's absolute [Kelvin] temperature.

CHAPTER 3 - ELEMENTS, COMPOUNDS AND MIXTURES

Atom	An atom – is the smallest particle of an element which can take part in a chemical reaction and is considered the basic unit of matter. eg. O, H, Cl are atoms.
Molecule	A molecule – is the smallest particle of a substance that can normally exist separately and retain the characteristics of the substance. eg. O ₂ , H ₂ , Cl ₂ are molecules.
Ion	An ion – is any atom or a group of atoms which has a resultant charge due to loss or gain of electrons. eg. O ²⁻ , H ¹⁺ , Cl ¹⁻ are ions.
Metals	Elements – which generally have lustre, are good conductors of electricity, are malleable and ductile. eg. K, Na, Ca, Mg. etc.
Non-metals	Elements – which generally lack lustre, are bad conductors of heat and electricity and are not malleable or ductile. eg. H, N, O, F, etc.
Metalloids	Elements – which generally have properties mid-way between metals and nonmetals. eg. Arsenic [As], Antimony [Sb]
Noble gases	Elements – which occur in the free state in traces in atmosphere, are gaseous in nature and are chemically inactive or inert. eg. Helium [He], Neon [Ne], Argon [Ar] etc.
Element	Is a pure substance – which cannot be converted or broken down into two or more simpler substances by any physical or chemical process. eg. Na ; Cl
Compound	Is a pure substance – composed of two or more elements combined chemically – in a fixed proportion whose properties are different from the properties of the constituent elements. eg. NaCl
Mixture	Consists of two or more substances, elements, compounds or both – mixed in any proportion by mass & which retains the properties of its constituent elements or compounds. eg. NaCl + sulphur

SEPARATION OF MIXTURES - Processes involved

Solvent extraction [solvent & filtration]	Separation of one insoluble solid from the other soluble solid – by using a particular liquid [solvent]. eg. <i>separation of sodium chloride [soluble] from sand [insoluble] using solvent water.</i>
Evaporation	Separation of a solid non-volatile constituent [generally soluble] of a mixture from its liquid constituent – by allowing the solvent [liquid constituent] to vaporize completely. eg. <i>separation of sodium chloride from its aqueous solution.</i>
Distillation	Separation of soluble solid constituent of a mixture from its liquid constituent – by evaporation of the liquid component followed by recondensing of the vapours obtained. eg. <i>purification of water containing dissolved solids.</i>

Fractional distillation	Separation of two miscible liquid components – using a distillation flask with a fractionating column. Separation due to difference in – boiling point of the two liquids. eg. <i>separation of benzene and toluene.</i>
Separating funnel	Separation of two immiscible liquid constituents of a mixture – using a glass apparatus called separating funnel. Liquids separate out due to difference in densities of the two liquids. e.g. <i>water and carbon tetrachloride.</i>
Chromatography	Separation of different dissolved constituents of a mixture – based on difference in adsorption of the different constituents on the surface of an appropriate adsorbent material. e.g. <i>separation of colouring matter in ink.</i>
Centrifugation	Separation of a more dense component of a mixture from the less dense component – using centrifugal force. The more dense component of the mixture migrates away from the axis of the centrifuge when rotated at high speed in a centrifuge machine. e.g. <i>separation of cream from milk.</i>

OTHER METHODS OF SEPARATION

Fractional crystallization	Separation of one soluble solid from the other soluble solid – with widely different solubilities in the particular liquid [solvent]. eg. <i>separation of KNO_3 [more soluble] from $KClO_3$ [less soluble] using the solvent water.</i>
Sublimation	Separation of one soluble solid from the other soluble solid [in the same solvent] – one of which sublimes on heating the mixture. eg. <i>separation of NH_4Cl [sublimable] from $NaCl$ [non-sublimable] by action of heat on the mixture.</i>
Magnetic separation	Separation of two solid components – one of which is magnetic in nature while the other is nonmagnetic. eg. <i>separation of iron and copper filings.</i>
Sedimentation & decantation	Separation of an insoluble solid constituent of a mixture from its liquid constituent – by allowing it to settle down at the base [insoluble solid – sediment]. The process of pouring off the upper clear [supernatant liquid] without disturbing the sediment is known as decantation. eg. <i>separation of sand [insoluble solid] from water.</i>
Filtration	Separation of an insoluble solid constituent of a mixture from its liquid constituent – by passage through a filter [a porous material]. eg. <i>separation of chalk [insoluble] from chalk water mixture.</i>

CHAPTER 4 - THE LANGUAGE OF THE CHEMISTRY

Symbol	A symbol – represents a specific element or one atom of an element. e.g. K , Na .
Valency	The number of hydrogen atoms which can combine with or displace – one atom of the element or radical so as to form a compound. e.g. K^{1+} , Cl^{1-} .
Radical	A radical – is a group of atoms of elements that behaves like a single unit and shows a valency. e.g. <i>Positive radicals – Ammonium $[NH_4^{1+}]$.</i> A simple radical may be made of one kind of atoms while a compound radical of two or more.
Chemical formula	A molecule of a substance ie. element or compound – could be represented by – symbols. Representation known as 'Chemical formula'. e.g. KCl

CHAPTER 5 - PHYSICAL AND CHEMICAL CHANGES

Physical change	A change in which the substance retains its identity and changes in form or state – without altering in composition. A physical change – is temporary & easily reversible. e.g. <i>melting of solids</i>
Chemical change	A change in which the substance loses its identity and produces one or more new substances – by change in its composition. It is permanent and not easily reversible. e.g. <i>addition of acids to substances, burning of substances in air, etc.</i>
Direct combination reaction	A chemical reaction in which two or more elements or compounds react – to form one new compound as a product. Representation : $X + Y \rightarrow XY$
Decomposition reaction	A chemical reaction in which a chemical compound decomposes or splits up – into two or more simpler substances. Representation : $XY \rightarrow X + Y$ <i>Thermal decomposition - decomposition reaction by heat</i>

Displacement reaction	A chemical reaction which takes place when an element [or radical] – has replaced another element in a compound. <i>Representation</i> : $X + YZ \rightarrow Y + XZ$
Double decomposition	A chemical reaction in which two reactants are both decomposed to form – new substances by exchanging their radicals. <i>Representation</i> : $XY + AB \rightarrow XB + AY$
Catalytic reaction	A chemical reaction which employs a catalyst to alter the rate of a reaction. [Catalyst is a substance which alters the rate of the reaction but which remains chemically and quantitatively unchanged at the end of the reaction.] eg. MnO_2 , Pt .
Reversible reaction	A chemical reaction in which the products formed react together to form – the original reactants depending on conditions of the reaction. <i>Representation</i> : $A + B \rightleftharpoons C + D$
Thermal Dissociation	A reaction in which a substance dissociates into two or more simpler substances – on application of heat & the reaction is reversible. <i>Representation</i> : $XY \xrightleftharpoons{\Delta} X + Y$
Oxidation	Reaction involving addition of oxygen to a substance, removal of hydrogen from a substance, addition of electronegative element, removal of electropositive element, loss of electrons from an atom or ion.
Reduction	Reaction involving removal of oxygen from a compound, addition of hydrogen to a compound, removal of electronegative element, addition of electropositive element, gain of electrons from an atom or ion.
Redox reaction	A chemical reaction involving – oxidation of one substance and reduction of the other is called a – redox reaction. All chemical reactions involving loss or gain of electrons are considered redox reactions where – oxidation and reduction occur simultaneously. e.g. $Cl_2 + H_2S \rightarrow 2HCl + S$
Oxidising agents	Loses oxygen or electronegative radical, gains hydrogen or electropositive radical & accepts electrons from an atom or an ion. eg. O_2 , <i>conc.</i> HNO_3 , MnO_2 , PbO_2 , etc.
Reducing agents	Gains oxygen or electronegative radical, loses hydrogen or electropositive radical & donates electrons to an atom or an ion. eg. H_2 , HCl , NH_3 , C [coke], etc.
Exothermic reaction	A chemical reaction which proceeds with evolution of – heat energy is called an exothermic reaction. eg. $C + O_2 \rightarrow CO_2 + \Delta T$
Endothermic reaction	A chemical reaction which proceeds with absorption of – heat energy is called an endothermic reaction. eg. $N_2 + O_2 \rightarrow 2NO - \Delta T$
Photochemical reaction	A chemical reaction which proceeds with absorption of – light energy is called a photochemical reaction. eg. $H_2 + Cl_2 \rightarrow 2HCl$ [in presence of sunlight]
Electrochemical reaction	A chemical reaction which proceeds with absorption of – electrical energy is called an electrochemical reaction. eg. $2H_2O \rightarrow 2H_2 + O_2$ [passage of electric current]
Burning	Burning or combustion is a chemical reaction involving oxidation i.e. – combination of substances with oxygen or air, mostly accompanied by – the production of heat & light. e.g. <i>burning of magnesium in air.</i>
Combustible substances	A substance which can burn in air or oxygen is called a – combustible substance. eg., CO , H_2 .
Supporter of combustion	It is the gaseous environment that supports combustion by – allowing occurrence of oxidation eg., Cl_2 , O_2 .

CHAPTER 6 - WATER

Solvent	The liquid [generally water] or medium of dissolution which allows – the solute to dissolve in it so as to form a solution is called a solvent. e.g. <i>water</i> .
Solute	The substance which dissolves in the solvent to form a solution – is called a solute. e.g. $NaCl$.
Solution	A homogenous mixture of a – solute in a solvent. e.g. <i>$NaCl$ dissolved in water.</i>
Unsaturated solution	A solution which can dissolve more of the solute at a given temperature – is called an unsaturated solution at that temperature.

Saturated solution	A solution which cannot dissolve more of the solute at a given temperature – is called a saturated solution at that temperature.
Solubility	The solubility of a solute in a solvent at a particular temperature – is the max. amount of the solute in grams that will saturate 100 grams of the solvent at that temperature.
Efflorescent crystal	Crystalline hydrated salts which on exposure to the atmosphere – <i>lose</i> their moisture partly or completely and change into the amorphous state eg. <i>washing soda</i> .
Deliquescent crystal	Water soluble salts which on exposure to the atmosphere – <i>absorb</i> moisture from the atmosphere, dissolve in the same and change into the liquid state eg. <i>Iron [III] chloride</i>
Hygroscopic substance	Are substances which – absorb moisture from the atmosphere when exposed to air but unlike deliquescent do not change their state eg. <i>quicklime, anhydrous CaCl_2</i> .
Drying or Desiccating agents	Are substances which – can readily absorb or remove moisture from other substances. eg. <i>fused calcium chloride</i> .
Water Pollution	It is an undesirable change in chemical, physical & biological conditions of water due to the – presence of foreign substances in water.
Eutrophication	It is the increase in chemical nutrients in an ecosystem.
Oil Spill	It is the leakage of oil & petroleum products into marine water due to accidents.

CHAPTER 7 - ATOMIC STRUCTURE

Subatomic particles	The three subatomic particles which are of great importance in the understanding of the structure of an atom are – <i>protons</i> [${}_{+1}^1\text{p}$], <i>electrons</i> [${}_{-1}^0\text{e}$] and <i>neutrons</i> [${}_0^1\text{n}$] [where the subscript and the superscript represents the charge and mass respectively].
Atomic number [Z]	Atomic number of an element is the – <i>number of protons</i> in the nucleus of an atom; <i>number of electrons</i> in the complete atom - & <i>positive charges in the nucleus</i> of its atom $Z = p = e$. e.g. <i>atomic number = no. of protons [p] = no. of electrons [e]</i> .
Mass number [A]	It is the total number of protons & neutrons in the atom of an element $A = n + p$.
Isotopes	Isotopes – are atoms of the same element having – same atomic number but different mass numbers. eg. ${}^{35}_{17}\text{Cl}$, ${}^{37}_{17}\text{Cl}$.

CHAPTER 8 - THE PERIODIC TABLE

Dobereiner's Law of Triads	Chemically analogous elements arranged in increasing order of their atomic weights formed groups of three called – ' <i>triads</i> ' in which atomic weight of the middle element was found to be the average of the atomic weight of the first and third elements.
Newland's Law of Octaves	Elements when arranged in increasing order of their atomic weights showed resemblance in physical & chemical properties between the – eighth and the first element. e.g. <i>Lithium [Li] & Fluorine [F]</i> .
Mendeleeff's Periodic Law	The physical & chemical properties of elements are – periodic functions of their – <i>atomic weights</i> .
Modern Periodic Law	The physical & chemical properties of elements are – periodic functions of their – <i>atomic numbers</i> .

CHAPTER 9 - STUDY OF FIRST ELEMENT - HYDROGEN

Hydrogenation	Addition of hydrogen to organic compounds in the presence of a catalyst eg. platinum or nickel is called – <i>hydrogenation</i> eg., <i>hydrogenation of oils</i> .
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CHAPTER 10 - ATMOSPHERIC POLLUTION

Acid Rain	The various ways in which acids formed in the atmosphere condense and fall on the earth as wet deposits eg. rain, snow, fog or dry deposits eg. particles.
Green house effect	It is the warming up of the earth's surface, due to the concentration or blanketing effect of the green house gases eg. CO_2 , CH_4 . The green house effect results in rise in atmospheric temperatures, which has a global impact and is termed – global warming.
Ozone layer	Ozone gas [O_3] is present as a layer in the stratosphere above the earth. It's destruction by certain chemicals like chlorofluorocarbons is responsible for ozone depletion.