9. Solutions

1. The process of food assimilation by man is in the form of solution.
2. Blood and lymph are in the form of solution.
3. A solution is a homogeneous mixture of two (or) more substances.
4. All solutions exist in homogeneous form.
5. **Homogeneous -** state in which two (or) more substances are uniformly present in a given mixture.
6. If a solution contains two components, then it is called as a **Binary Solution**.
7. Example for binary solution - Salt solution.
8. In a solution, the component present in lesser amount by weight is called **solute** and the other in a larger amount by weight is called **solvent.**
9. A solvent is a dissolving medium.
10. **Solute + Solvent → Solution.**
11. Based on the particle size of the solute, the solutions are divided into three types – true solution, colloidal solution and Suspension.
12. **True solution** is a homogeneous mixture with small solute particles dissolved in the solvent eg. Sugar in water.
13. **Colloidal solution** is a heterogeneous mixture made up dispersed phase and dispersion medium.
14. In a colloidal solution, the substance distributed as particles is called **dispersed phase.**
15. In a colloidal solution, the continuous phase in which the colloidal particles are dispersed is called **dispersion medium.**
16. **Suspension** is a heterogeneous mixture of small insoluble particles in a solvent.
17. In a suspension, the particles of solid stay in clusters that are large enough to be seen (e.g. Chalk powder in water).

18. **In a true Solution** the particles are of 1A^o to 10 $A^{o,}$ transparent, not visible even under ultra microscope, homogeneous, diffuse rapidly, and do not scatter light .
19. **In a Colloidal Solution** the particles are of 10 A^o to 1000 A^o, translucent, visible under ultra Microscope, heterogeneous, diffuse slowly, and scatter light.
20. **In a Suspension,** the particles are more than 1000 A^o, opaque, visible to the naked eye, heterogeneous, don't diffuse, and do not scatter light.
21. Based on the type of solvent solutions are classified in to aqueous solution and non - aqueous solution.
22. The solution in which water acts as a solvent is called **aqueous solution**. For e.g., sugar solution.
23. The solution in which any liquid other than water acts as a solvent is called **non-aqueous solution**. e.g.,Sulphur in carbon disulphide. (Benzene, ether, CS_2, are some of the examples for non aqueous solvents.)
24. Based on the amount of solute in the given amount of solvent, solutions are classified into Unsaturated solution, Saturated solution and Super saturated solution.
25. A solution in which the solute is in lesser amount in comparison with the solvent is called unsaturated solution.
26. In unsaturated solution, addition of solute is possible till the solution reaches the point of saturation. e.g., 5g or 10g or 20g of NaCl in 100g water.
27. A solution in which no more solute can be dissolved in a definite amount of solvent at a given temperature is called a saturated solution e.g., A saturated solution of CO_2 in H_2O.
28. 36g of NaCl in 100g of water at room temperature forms saturated solution.
29. A solution which has more of solute at a given temperature than that of saturated solution is called **super saturated solution**.
30. Solubility of a solute is defined as the number of grams of solute necessary to saturate 100g of the solvent.

31. Solubility of $CuSO_4$ in H_2O is 20.7g at 20^oC.

32. **Factors affecting solubility –** Temperature, Nature of solute (or) solvent and Pressure.

33. In endothermic process, solubility increases with increase in temperature.

34. In exothermic process, solubility decreases with increase in temperature.

35. A polar compound dissolves in a polar solvent. E.g., Common salt dissolves in water.

36. A polar compound is less soluble (or) insoluble in a non polar solvent.

37. An increase in pressure increases the solubility of a gas in a liquid.

10. Atoms and molecules

1. The word atom is derived from the Greek word “Atomos” which means indivisible.
2. John Dalton modeled atoms as hard indivisible spheres.
3. Atom is considered to be a divisible particle.
4. Atoms of the same element may not be similar in all respects. eg:Isotopes (Cl^{35}_{17} , Cl^{37}_{17})
5. Atoms of different elements may be similar in some respects eg. Isobars (Ar^{40}_{18}, Ca^{40}_{20})
6. Atom is the smallest particle which takes part in chemical reactions.
7. The ratio of atoms in a molecule may be fixed and integral but may not be simple e.g., $C_{12}H_{22}O_{11}$ is not a simple ratio (Sucrose).
8. Atoms of one element can be changed into atoms of other element by transmutation.
9. The mass of an atom can be converted into energy. This is in accordance with Einstein ’ s equation $E = mc^2$.
10. Amedeo Avogadro put forward hypothesis and is based on the relation between number of molecules and volume of gases.
11. Avogadro’s Law: Equal volumes of all gases under the same conditions of temperature and pressure contain the equal number of molecules.
12. Avogadro’s law plays an important role in (a) deducing atomicity of gases and (b) establishing the relation between vapour density and molecular mass.

13. The number of atoms present in one molecule of an element is called the atomicity of an element.
14. Depending upon the number of atoms in one molecule of an element, molecules are classified into monoatomic, diatomic, triatomic, and poly atomic molecules.
15. Avogadro's law enables us to changeover directly from a statement about volume of gases to a statement about molecules of gases and vice-versa.
16. Nitrogen and oxygen are called diatomic molecules and are written as N_2 and O_2.
17. Atomicity of nitrogen is 2 and the atomicity of oxygen is 2.
18. Relative Molecular Mass is defined as the ratio of the mass of 1 molecule of the gas or vapour to the mass of 1 atom of hydrogen.
19. Vapour Density (V.D) is defined as the ratio of the mass of a certain volume of the gas or vapour to the mass of the same volume of hydrogen at the same temperature and pressure.
20. Avogadro's law is used to determine the atomicity of gases.
21. Avogadro's law is helpful in determining the molecular formula of gaseous compound.
22. Avogadro's law establishes the relationship between the vapour density and molecular mass of a gas.
23. Avogadro's law gives the value of molar volume of gases at STP.
24. Molar Volume of a gas at STP=22.4 lit (or) 22400 cm^3.
25. Avogadro's law explains Gay Lussac's law effectively.
26. Atoms and molecules are the building blocks of matter.
27. Atom is the ultimate particle of an element which may or may not have independent existence.
28. The atoms of hydrogen, oxygen, nitrogen, etc. do not have independent existence.
29. Atoms of helium, neon, argon, etc. do have independent existence.
30. All elements are composed of atoms.

31. A molecule is the simplest structural unit of an element (or) a compound which contains one (or) more atoms.
32. An atom is the smallest particle of an element.
33. A molecule is the smallest particle of an element or a compound.
34. An atom is a non bonded entity.
35. A molecule is a bonded entity.
36. An atom may or may not exist freely.
37. A molecule can exist freely.
38. Molecules are of two types, namely homo atomic molecules and hetero atomic molecules.
39. Homo atomic molecules are the molecules which are made up of atoms of the same element.
40. Most of the elementary gases consist of homo atomic molecules.
41. Hydrogen gas consists of two atoms of hydrogen (H_2).
42. Oxygen gas consists of two atoms of oxygen (O_2).
43. By the number of atoms present in the molecules they are classified as monoatomic, diatomic, triatomic or poly atomic molecules.
44. The molecules are made up of atoms of different elements.
45. H_2O, NH_3, CH_4, etc., are hetero atomic molecules.
46. Relative atomic mass of an element is the ratio of mass of one atom of the element to the mass of one atom of hydrogen taken as one unit.
47. Relative atomic mass of an element is the ratio of mass of one atom of element to the $1/12^{th}$ part of mass of one atom of carbon.
48. Relative atomic mass is a pure ratio and has no unit.
49. If the atomic mass of an element is expressed in grams, it is known as gram atomic mass.

50. Gram atomic mass of hydrogen = 1g.
51. Gram atomic mass of carbon = 12g.
52. Gram atomic mass of nitrogen = 14g.
53. Gram atomic mass of oxygen = 16g.
54. Gram atomic mass of sodium = 23g.
55. Atomic mass is expressed in atomic mass unit (amu).
56. One atomic mass unit is defined as 1/12th part of the mass of one atom of carbon.
57. The relative molecular mass of an element or a compound is the ratio of mass of one molecule of the element or a compound to the mass of one atom of hydrogen.
58. The relative molecular mass of an element or a compound is the ratio of mass of one molecule of the element or a compound to the mass of $1/12^{th}$ part of mass of one atom of carbon.
59. Relative molecular mass is a pure ratio and has no unit.
60. If the molecular mass of a given substance is expressed in gram, it is known as gram molecular mass of that substance.
61. Molecular mass is the sum of atomic masses.
62. Number of atoms or molecules or ions present in one mole of a substance is called Avogadro number. Its value is 6.023×10^{23}.
63. Mole is defined as the amount of substance that contains as many specified elementary particles as the number of atoms in 12g of carbon-12 isotope.
64. One mole is defined as the amount of substance which contains Avogadro number (6.023×10^{23}) of particles.
65. One mole of any substance contains Avogadro number of particles.
66. One mole of oxygen atoms represents 6.023×10^{23} atoms of oxygen.

11. Chemical Reactions

1. Physical changes can be easily reversed
2. Chemical changes are more permanent than physical changes.
3. All chemical changes are accompanied by chemical reactions.
4. Silver anklet has got tarnished, due to the formation of silver sulphide (Ag_2S), as a result of the reaction between silver and hydrogen sulphide in the air.
5. Calcium oxide reacts with water to produce slaked lime (calcium hydroxide).
6. Formation of slaked lime is an exothermic, accompanied by hissing sound and bubbles.
7. The brisk effervescence is due to the evolution of carbon dioxide gas.
8. The substances taking part in the reaction are known as reactants and those formed as a result of the reaction are called products.
9. the chemical formula for marble is also $CaCO_3$.
10. Chemical reactions are classified into six categories - combination reaction, decomposition reaction, displacement reaction, double decomposition reaction / double displacement reaction, Oxidation and reduction
11. A combines with B to form a new product AB. (combination reaction).
12. Magnesium combines with oxygen to form a single product, magnesium oxide. Such a reaction in which a single product formed from two or more reactants is known as combination reaction. $2Mg + O_2 \rightarrow 2MgO$.
13. Combustion of coal and Combustion of hydrogen are examples of combination reaction.
14. AB splits into A and B (decomposition reaction). E.g.,Decomposition of lime stone, decomposition of ammonium dichromate, chemical volcano.
15. In the reaction between A and BC, A displaces B from BC to form AC (displacement reaction).
16. Lead can displace copper from its salt solutions.

17. Copper can't displace zinc or lead from their salt solutions, because copper is less reactive than zinc and lead.
18. The reaction in which, a more reactive element displaces a less reactive element from its compound is called displacement reaction.
19. Double decomposition reaction / double displacement reaction - In the reaction between AB and CD, both the reactants decompose to form AD and CB through the rearrangement of ions.
20. Double decomposition reaction is any reaction in which exchange of ions between two reactants occurs, leading to the formation of two different products.
21. Oxidation and reduction Fading of the colours of the clothes, burning of substances like cooking gas, wood and coal, and also rusting of iron articles – due to oxidation – reduction reaction (redox reaction).
22. A large number of industrial processes like electroplating, extraction of metals like aluminium, are based upon the redox reaction.
23. Oxidation is a chemical reaction which involves addition of oxygen or removal of hydrogen or loss of electron(s).
24. Reduction is a chemical reaction which involves addition of hydrogen or removal of oxygen or gain of electron(s).
25. Redox reaction is a chemical reaction in which oxidation and reduction take place simultaneously.
26. Loss of electron is oxidation (LEO). Gain of electron is reduction (GER).
27. Oxidation is Gain of oxygen / Loss of hydrogen / Loss of electron(s).
28. Reduction is Loss of oxygen / Gain of hydrogen / Gain of electron(s).
29. One of the most common changes during chemical reactions is a change in temperature.
30. Oxidation also has damaging effects on food and eatables.

31. The chemical reactions which proceed with the evolution of heat energy are called exothermic reactions. Eg., $N_2 + 3H_2 \rightarrow 2NH_3 + Heat$
32. All combustion reactions are exothermic.
33. The chemical reactions which proceed with the absorption of heat energy are called endothermic reactions. Eg., $2NH_3 + Heat \rightarrow N_2 + 3H_2$
34. Rate of the chemical reaction is defined as change in concentration of any one of the reactants or products per unit time.
35. Rate of the reaction is given by d[A] d[B]
36. The greater the surface area, greater is the rate of the reaction.
37. Acid is a substance which furnishes H+ ions or H_3O+ ions when dissolved in water.
38. Acids have one or more replaceable hydrogen atoms.
39. The word acid is derived from the Latin name ‘ acidus ’ which means sour taste.
40. Substances with ‘ sour taste ’ are acids.
41. Lemon juice, vinegar and grape juice have sour taste, so they are acidic.
42. Acids change blue litmus to red.
43. A substance which alters the rate of the reaction without undergoing any change in mass and composition is known as catalyst.
44. Acids are colorless with phenolphthalein and pink with methyl orange.
45. Many organic acids are naturally present in food items.
46. Based on the source, acids are classified into organic acids and inorganic acids.
47. Organic acids are present in plants and animals (living beings) eg. HCOOH, CH_3COOH (Weak acids).
48. Inorganic (mineral) acids are found in rocks and minerals. eg., HCl, HNO_3, H_2SO_4 (Strong acids).
49. Based on their basicity acids are classified into monobasic, dibasic and tribasic acids.

50. Monobasic acid is an acid which gives one hydrogen ion per molecule of the acid in solution e.g., HCl, HNO_3.
51. Dibasic acid is an acid which gives two hydrogen ions per molecule of the acid in solution e.g., H_2SO_4, H_2CO_3.
52. Tribasic acid is an acid which gives three hydrogen ions per molecule of the acid in solution. e.g.,H_3PO_4,
53. Based on ionization, acids are classified into two types - strong acids and weak acids.
54. Strong acids ionize completely in water e.g., HCl .
55. Weak acids ionize partially in water e.g., CH_3COOH.
56. Based on concentration, acids are classified into concentrated acid and dilute acid.
57. Concentrated acid has high percentage of acid in its aqueous solution.
58. Dilute acid has low percentage of acid in aqueous solution.
59. Acids turn blue litmus paper red.
60. Apple contains malic acid.
61. Lemon contains Citric acid.
62. Grapes contain Tartaric acid.
63. Tomato contains Oxalic acid.
64. Vinegar (food preservative) contains Acetic acid.
65. Curd contains Lactic acid.
66. Basicity is the number of replaceable hydrogen atoms present in one molecule of an acid.
67. All metals do not liberate hydrogen gas on reaction with acids.e.g., Ag, Cu.
68. Lime stone, chalk and marble are different physical forms of calcium carbonate.
69. Sulphuric acid (King of chemicals) is used in car battery and in the preparation of many other compounds.

70. Nitric acid is used in the production of ammonium nitrate which is used as fertilizer in agriculture.
71. Hydrochloric acid is used as cleansing agent in toilet.
72. Tartaric acid is a constituent of baking powder.
73. Salt of benzoic acid (sodium benzoate) is used in food preservation.
74. Carbonic acid is used in aerated drinks.
75. An acid produces hydrogen ions in water.
76. Hydrogen ions exist in the form of hydronium (H_3O^+) ions with water.
77. The atmosphere of Venus is made up of thick white and yellowish clouds of sulphuric acid.
78. The term acidity means the number replaceable hydroxyl groups present in one molecule of a base.
79. Base is a substance which releases hydroxide ions when dissolved in water.
80. Base is bitter in taste and soapy to touch (e.g. Washing soda, caustic soda and caustic potash).
81. Bases change red litmus to blue. They are pink with phenolphthalein and yellow with methyl orange.
82. Based on ionization, bases are classified in to strong bases and weak bases. Strong bases ionize completely in aqueous solution eg.NaOH, KOH.
83. Weak bases ionize partially in aqueous solution eg. NH_4OH, $Ca(OH)^2$.
84. Based on their acidity, bases are classified in to monoacidic, diacidic and triacidic bases.
85. Monoacidic base is a base which ionizes in water to give one hydroxide ion per molecule eg.NaOH, KOH.
86. Diacidic base is a base which ionizes in water to give two hydroxide ions per molecule eg. $Ca(OH)^2$, $Mg(OH)^2$.

87. Triacidic base is a base which ionises in water to give three hydroxide ions per molecule eg. $Al(OH)^3$, $Fe(OH)^3$.
88. Based on the concentration, bases are classified in to Concentrated and dilute alkali.
89. Concentrated alkali is an alkali having a relatively high percentage of alkali in its aqueous solution.
90. Dilute alkali is an alkali having a relatively low percentage of alkali in its aqueous solution.
91. Bases generate hydroxide (OH^-) ions when dissolved in water.
92. Bases which dissolve in water are called alkalies. All alkalies are bases, but not all bases are alkalies.
93. NaOH and KOH are alkalies.
94. Sodium hydroxide is used in the manufacture of soap.
95. Calcium hydroxide is used in white washing the buildings.
96. Magnesium hydroxide is used as a medicine for stomach troubles.
97. Ammonium hydroxide is used to remove grease stains from clothes.
98. pH stands for the power of hydrogen ion concentration in a solution.
99. pH values decide whether a solution is acidic or basic or neutral.
100. pH scale was introduced by S.P.L. Sorenson. It is mathematically expressed as pH = -log10 [H+]
101. For neutral solution [H+] = 10−7M; pH = 7
102. For acidic solution [H+] > 10–7M; pH < 7
103. For basic solution [H+] < 10–7M; pH > 7
104. pH of Lemon juice is 2.2 – 2.4
105. pH of Tomato juice 4.1
106. pH of Coffee 4.4 - 5.5

107. pH of Human saliva 6.5 - 7.5

108. pH of House hold ammonia 12.0

109. At pH level 6.9, the body becomes prone to viral infections like colds, cough and flu.

110. Cancer cells thrive inside the body at a pH of 5.5.

111. The pH of a normal, healthy human skin is 4.5 to 6.

112. pH of stomach fluid is approximately 2.0.

113. Human blood pH range is 7.35 to 7.45.

114. The ideal pH for blood is 7.4.

115. pH of normal saliva ranges between 6.5 to 7.5.

116. White enamel coating in our teeth is calcium phosphate, hardest substance in our body.

117. If pH of mouth falls below 5.5, the enamel gets corroded.

118. Toothpastes are generally basic.

119. Citrus fruits require slightly alkaline soil, while rice requires acidic soil and sugar cane requires neutral soil.

120. pH of rain water is approximately 7 showing high level of its purity and neutrality.

121. If rain water is polluted by SO_2 and NO_2, acid rain occurs.

122. Salts are the products of the reaction between acids and bases.

123. A normal salt is obtained by complete neutralization of an acid by a base. e.g., NaOH + HCl $\rightarrow$ NaCl + H_2O

124. Acid salts are derived by the partial replacement of hydrogen ions of an acid by a metal.

125. Basic salts are formed by the partial replacement of hydroxide ions of a diacidic or triacidic base by an acid radical.

126. A basic salt may react with an acid to give a normal salt.

127. Double salts are formed by the combination of saturated solution of two simple salts in equimolar ratio followed by crystallization. e.g., potash alum.

128. Common salt (NaCl) It is used in our daily food and as preservative.
129. Washing soda (Na_2CO_3) is used in softening hard water, as a cleaning agent.
130. Baking soda ($NaHCO_3$) is used in making baking powder.
131. Baking powder is the mixture of baking soda and tartaric acid.
132. Baking powder is used to make cake and bread soft and spongy .
133. Baking soda is an ingredient in antacid.
134. Bleaching powder ($CaOCl_2$) is used for disinfecting drinking water to make it free from microorganisms.
135. Bleaching powder is used for bleaching cotton and linen in the textile industry.
136. Plaster of paris ($CaSO_4$. $1/2H_2O$) is used for plastering fractured bones and in making casts for statues.

12. MODERN PERIODIC TABLE

1. As on date one hundred and eighteen elements are known.
2. Real credit for preparing the periodic table goes to Mendeleev.
3. Moseley suggested that atomic number (Z) should be the basis of the classification of the element.
4. Moseley gave modern periodic law.
5. Modern periodic law states that “the physical and chemical properties of elements are the periodic function of their atomic numbers.”
6. The modern periodic table commonly is based upon the electronic configuration of elements.
7. The modern periodic table has also been divided into four blocks known as s, p, d and f blocks.
8. In the periodic table, horizontal rows are called periods and vertical columns are called groups.

9. There are seven horizontal rows in the periodic table.
10. First period (Atomic number 1 and 2) is the shortest period and contains only two elements (hydrogen and helium).
11. Second period (Atomic number 3 to 10) is a short period with eight elements (lithium to neon).
12. Third period (Atomic number 11 to 18) is also a short period and has eight elements (sodium to argon).
13. Fourth period (Atomic number 19 to 36) is a long period and contains eighteen elements (potassium to krypton).
14. Fifth period (Atomic number 37 to 54) is also a long period and has 18 elements (rubidium to xenon). This includes 8 normal elements and 10 transition elements.
15. IV & V periods include 8 normal elements and 10 transition elements.
16. Sixth period (Atomic number 55 to 86) is the longest period and has 32 elements (ceasium to radon).
17. VI period includes 8 normal elements, 10 transition elements and 14 inner transition elements (lanthanides).
18. Seventh period (Atomic number 87 to 118) also has 32 elements.
19. Only 26 elements have been authenticated by IUPAC.
20. Vertical columns in the periodic table starting from top to bottom are called groups.
21. There are 18 groups in the periodic table.
22. First group elements are called alkali metals.
23. Second group elements are called alkaline earth metals.
24. Groups' three to twelve are called transition elements.
25. Group 1, 2 and 13 - 18 are called normal elements or main group elements or representative elements.
26. Group 16 elements are called chalcogen family (except polonium).

27. Group 17 elements are called halogen family.
28. Group 18 elements are called noble gases or inert gases.
29. The lanthanides and actinides which form part of the group 3 are called inner transition elements.
30. Atomic size of the elements in a period decreases from left to the right.
31. In a period, the metallic character of the element decreases while their non-metallic character increases.
32. The elements present in 2 and 18 groups differ in atomic number by 8, 8, 18, 18, 32.
33. The elements present in 13 – 17 groups differ in atomic number by 8, 18, 18, 32.
34. The elements present in 4 – 12 groups differ in atomic number by 18, 32, 32.
35. The elements present in a group have the same number of electrons in the valence shell of their atoms.
36. The elements present in a group have the same valency.
37. The elements present in a group have identical chemical properties.
38. The physical properties of the elements in group such as melting point, boiling point, density vary gradually.
39. Atomic radii of the elements present in a group increases downwards.
40. Position of hydrogen is not fixed till now.
41. Copper was the first metal to be used for making utensils, weapons and for other works.
42. Metals like titanium, chromium, manganese, zirconium etc. are used in the manufacture of defense equipments.(strategic metals).
43. The metal uranium plays, a vital role in nuclear reactions releasing enormous energy called nuclear energy.
44. Copper, silver and gold are called coinage metals as they are used in making coins, jewellery etc.

45. Vietnamese Craft Work in silver Aluminium foil Bangles.
46. Purity of gold is expressed in carat.
47. A mineral may be a single compound or complex mixture of various compounds of metals which are found in earth.
48. The mineral from which a metal can be readily and economically extracted on a large scale is said to be an ore.
49. Clay ($Al_2O_3.2SiO_2.2H_2O$) and bauxite ($Al_2O_3.2H_2O$) are the two minerals of aluminium.
50. Aluminium is profitably extracted only from bauxite.
51. Bauxite is an ore of aluminium and clay is its mineral.
52. Minerals contain a low percentage of metal and ores contain a large percentage of metal.
53. Metals cannot be extracted easily from mineral.
54. Ores can be used for the extraction of metals.
55. All minerals cannot be called as ores, but all ores are minerals.
56. The process of extracting the ores from the earth crust is called mining.
57. Various steps involved in the extraction and refining of metals from their ores are known as metallurgy.
58. The rocky impurity, associated with the ore is called gangue or matrix.
59. Flux is a compound added to the ore to remove its impurities by fusion. e.g., CaO
60. Slag is the fusible product formed when flux reacts with gangue during the extraction of metals. Flux + Gangue $\rightarrow$ Slag
61. Smelting is the process of reducing the roasted oxide to metals in the molten condition.
62. Nearly 80 metallic elements are obtained from mineral deposits on or beneath the surface of the earth.
63. Metals which have low chemical reactivity are found in Free State, or in native state.
64. Gold, silver and platinum are examples of metals that are partly found in a free state.

65. Symbol for aluminium is Al
66. Colour of aluminium is Silvery white.
67. Atomic number of aluminium is 13.
68. Electronic configuration of aluminium is 2, 8, 3.
69. Valency of aluminium is 3.
70. Atomic mass of aluminium is 27.
71. Position in the periodic table of aluminium is period=3, group=13 (III A).
72. Aluminium is the most abundant metal in the earth's crust.
73. Aluminium is a reactive metal and occurs in the combined state.
74. The important ores of aluminium - Bauxite $Al_2O_2.2H_2O$, Cryolite Na_3AlF_6, Corundum Al_2O_3.
75. The chief ore of aluminium is bauxite ($Al_2O_3.2H_2O$).
76. Extraction of aluminium from bauxite involves two stages.
77. Bauxite is converted into Alumina by Baeyer's Process.
78. In the Electrolytic reduction of Alumina by Hall's process, Aluminium is produced.
79. Aluminium has low density, malleable and ductile, good conductor of heat and electricity.
80. Melting point of aluminium is 660^oC
81. When steam is passed over red hot aluminium, hydrogen is produced.
82. Aluminium reacts with strong caustic alkalis forming aluminates.
83. With dilute and con. HCl aluminium liberates H_2 gas.
84. Aluminium liberates hydrogen on reaction with dilute sulphuric acid.
85. Sulphur dioxide is liberated with hot concentrated sulphuric acid.
86. Aluminium is a powerful reducing agent.
87. When a mixture of aluminium powder and iron oxide is ignited, the latter is reduced to metal. This process is known as aluminothermic process.
88. Symbol of copper is Cu.

89. Atomic mass of copper is 63.55.
90. Atomic number of copper is 29.
91. Electronic configuration of copper is 2, 8, 18, 1.
92. Valency of copper is 1 and 2.
93. Copper was named as cuprum by the Romans because they used to get it from the island of Cyprus.
94. Copper is found in the native state as well as in the combined state.
95. The chief ore of copper is copper pyrite. It yields nearly 76% of the world production of copper.
96. Ores of copper - Copper pyrite ($CuFeS_2$), Cuprite or ruby copper (Cu_2O), Copper glance (Cu_2S)
97. Blister copper contains 98% pure copper.
98. In Electrolytic refining of copper the electrolyte used is copper sulphate solution.
99. Copper is a reddish brown metal, with high luster, high density and high melting point (1356^oC).
100. Copper gets covered with a green layer of basic copper carbonate in the presence of CO_2 and moisture.
101. On heating at different temperatures in the presence of oxygen copper forms two types of oxides CuO (red), Cu_2O (black).
102. Copper dissolves in dilute HCl and H_2SO_4 in the presence of air.
103. Copper reacts with dil.HNO_3 and liberates Nitric Oxide gas.
104. Copper reacts with con.HNO_3 and con.H_2SO_4 and liberates nitrogen dioxide and sulphur dioxide.
105. Chlorine reacts with copper, resulting in the formation of copper (II) chloride.
106. Copper is extensively used for making electric cables and other electric appliances.
107. Copper is used for making utensils, containers, calorimeters, coins.

108. Copper is used in electroplating.
109. Copper is alloyed with gold and silver for making coins and jewels.
110. Symbol of Iron is Fe.
111. Colour of Iron is Grayish white.
112. Atomic mass of Iron is 55.9.
113. Atomic number of Iron is 26.
114. Valency of Iron is 2 & 3.
115. Electronic configuration of Iron is 2, 8, 14, 2.
116. Iron is the second most abundant metal after aluminium.
117. Iron occurs in nature as oxides, sulphides and carbonates.
118. Ores of iron Formula - Haematite (Fe_2O_3), Magnetite (Fe_3O_4), Iron pyrites (FeS_2).
119. In smelting, roasted ore, coke and limestone are in the ratio of 8:4:1.
120. Iron is a heavy metal of specific gravity 7.9
121. Iron is a lustrous metal and greyish white in colour.
122. Iron has high tensility, malleability and ductility.
123. Iron is a good conductor of heat and electricity.
124. Iron can be magnetized.
125. Calcination is a process in which ore is heated in the absence of air.
126. Roasting is a process in which ore is heated in the presence of excess of air.
127. The pig iron is remelted and cast into different moulds. This iron is called cast iron.
128. On heating in air, iron forms magnetic oxide.
129. When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. (rust)
130. When steam is passed over red hot iron, magnetic oxide of iron is formed.
131. Iron combines with chlorine to form ferric chloride.
132. With dilute HCl and dilute H_2SO_4 iron evolves H_2 gas.

133. With conc. H_2SO_4 iron forms ferric sulphate.
134. With dilute HNO_3 in cold condition iron gives ferrous nitrate.
135. When iron is dipped in conc. HNO_3 it becomes chemically inert or passive due to the formation of a layer of iron oxide (Fe_3O_4) on its surface.
136. Pig iron is used in making stoves, radiators, railings, man hole covers and drain pipes.
137. Steel is used in the construction of buildings, machinery, transmission and T.V towers and in making alloys.
138. Wrought iron is used in making springs, anchors and electromagnets.
139. An alloy is a homogeneous mixture of two or more metals fused together.
140. Alloys are solid solutions. Alloys can be considered as solid solutions in which the metal with high concentration is solvent and the metal with low concentration is solute. For example, brass is an alloy of zinc (solute) in copper (solvent).
141. An alloy is produced by fusing the metals together or by compressing finely divided metals one over the other.
142. An amalgam is an alloy of mercury with metals such as sodium, gold, silver, etc.,
143. Corrosion is defined as the slow and steady destruction of a metal by the environment.
144. Corrosion is a simple electro chemical reaction.
145. Alloys of copper - Brass (Cu,Zn), Bronze(Cu,Sn,Zn).
146. Alloys of aluminium - Duralumin (Al,Mg,Mn,Cu), Magnalium(Al,Mg).
147. Iron Alloys - Stainless steel (Fe,C,Ni,Cr), Nickel steel (Fe,C,Ni),
148. Corrosion of metals is prevented by not allowing them to come in contact with moisture,CO_2 and O_2.
149. Paint coated metal surfaces keep out air and moisture.
150. Application of oil and grease on the surface of iron tools prevents them from moisture and air.
151. Alloyed metal is more resistant to corrosion. Example: stainless steel.

152. Galvanization is a process of coating zinc on iron sheets by using electric current. In this zinc forms a protective layer of zinc carbonate on the surface of iron.
153. Electroplating is a method of coating one metal with another by passing electric current. Example: silver plating, nickel plating.
154. Magnesium coated on the steel articles it sacrifices itself to protect the steel.

13. Carbon and its compounds

1. The electronic configration of carbon is K=2, L=4.
2. Carbon has four electrons in the valence shell and belongs to group IV A (group 14) of the periodic table.
3. Carbon is a non metal. In nature, it occurs in its pure form as **diamond and graphite.**
4. When fuels burn, the carbon in them reacts with oxygen to form carbon dioxide.
5. Carbon compounds hold the key to plant and animal life on earth.
6. Carbon chemistry is called **Living Chemistry.**
7. Carbon circulates through air, plants, animals and soil by means of complex reactions. This is called **carbon cycle**.
8. Compounds of carbon are classified into two types - Inorganic compounds (obtained from non living matter) Organic compounds (obtained from living matter).
9. Carbon atoms form the building blocks for living organisms.
10. The term organic chemistry was used by the Swedish chemist Berzelius.
11. The German chemist Wohler succeeded in creating an organic compound (urea) from an inorganic compound (ammonium cyanate) in his laboratory.
12. The atomic number of carbon is 6 and its ground state electronic configuration is $1s^2$ $2s^2$ $2p^2$.
13. Since it has four electrons in its outermost shell, its valency is four.

14. To achieve noble gas configuration, carbon atom has to lose or gain four electrons to form C^{4+} and C^{4-} ions.
15. Carbon shares its valence electrons with other atoms, this characteristic is referred as tetra valency of carbon.
16. A molecule of methane (CH_4) is formed when four electrons of carbon are shared with four hydrogen atoms.
17. The most precious diamond is a crystalline allotrope of carbon.
18. Organic chemistry is defined as the branch of chemistry that deals with organic compounds which is made up of the hydrocarbons and their derivatives.
19. Allotropy is defined as the property by which an element can exist in more than one form that are physically different but chemically similar.
20. Carbon exists in three allotropic forms - crystalline form (diamond and graphite), amorphous form (coke,charcoal) and fullerene.
21. In diamond each carbon atom is bonded to four other carbon atoms forming a rigid three dimensional structure.
22. In graphite each carbon atom is bonded to three other carbon atoms in the same plane giving hexagonal layers held together by weak Vander Waals forces accounting for softness.
23. Graphite is a good conductor of electricity unlike other non-metals since it has free electrons in it.
24. Fullerenes are also carbon allotropes. The first one was identified to contain 60 carbon atoms in the shape of a football. (C-60). Since this looks like the geodesic dome designed by the US architect Buck Minster Fuller, it is named as Buck Minster Fullerene.
25. Carbon has the ability to form covalent bonds with other atoms of carbon giving rise to large number of molecules through self linking property. This property is called catenation.

26. Carbon compounds show isomerism.
27. Isomerism is the phenomenon by which two or more compounds to have same molecular formula but different structural formula with difference in properties.
28. Carbon compounds have low melting and boiling points.
29. Carbon compounds are easily combustible.
30. Carbon and its compounds burn in oxygen to give carbon dioxide along with heat and light.
31. Carbon compounds can be easily oxidized using suitable oxidizing agent Alkaline potassium permanganate) to form carboxylic acids.
32. Unsaturated carbon compounds undergo addition reactions with hydrogen in the presence of palladium or nickel catalyst.
33. Carbon compounds undergo substitution reactions in the presence of either sunlight or any other reagents.
34. Carbon compounds such as alcohols react with sodium to liberate hydrogen gas.
35. A homologous series is a group or a class of organic compounds having similar structure and similar chemical properties in which the successive compounds differ by a CH_2 group.
36. Each member of the series differs from the preceding or succeeding member by a common difference of CH_2 and by a molecular mass of 14 amu.
37. All members of homologous series contain same elements and the same functional groups.
38. All members of homologous series have same general molecular formula.
39. The members in homologous series show a regular gradation in their physical properties with respect to increase in molecular mass.
40. The chemical properties of the members of the homologous series are similar.

41. The simplest organic compounds containing only carbon and hydrogen are called Hydrocarbons.
42. Hydrocarbons are regarded as the parent organic compounds and all other compounds are considered to be derived from them.
43. Hydrocarbons are classified into - saturated and unsaturated hydrocarbons.
44. Saturated hydrocarbons – Alkanes (General formula = C_nH_{2n+2} Suffix : ane).
45. Saturated hydrocarbons are the organic compounds which contain carbon – carbon single bond.
46. Saturated hydrocarbons were earlier named as paraffins(Latin : meaning little affinity) due to their least chemical reactivity.
47. IUPAC name of n-Butane is Propane ($CH_3CH_2CH_3$)
48. IUPAC name of Propylene is Propene ($CH_3CH = CH_3$)
49. IUPAC name of Methyl acetylene is Propyne ($H_3C- C \equiv CH$)
50. IUPAC name of Ethylene is Ethene ($CH_2 = CH_2$)
51. IUPAC name of Acetylene is Ethyne ($HC \equiv CH$)
52. IUPAC name of α-Butylene is But–1–ene ($CH_2CH_2–CH=CH_2$)
53. IUPAC name of β-Butylene is But–2–ene ($CH_3CH = CHCH_3$)
54. IUPAC name of Dimethyl acetylene is But–2-yne ($H_3C – C \equiv C – CH_3$)
55. IUPAC name of Ethyl acetylene is But–1–yne ($H_3C - CH_2 –C \equiv CH$)
56. Unsaturated hydrocarbons are hydrocarbons which contain carbon to carbon double bonds or carbon to carbon triple bonds –C ≡ Cin their molecules.
57. Unsaturated hydrocarbons are classified into alkenes and alkynes.
58. Alkenes: General formula: C_nH_{2n} Suffix: ene.
59. The hydrocarbons containing atleast one carbon to carbon double bond are called alkenes.

60. Alkenes have the general formula C_nH_{2n}.
61. Alkenes were previously called olefins (Greek: olefiant – oil forming) because the lower gaseous members of the family form oily products when treated with chlorine.
62. In IUPAC system, the name of alkene is derived by replacing suffix ane of the corresponding alkane by ene.
63. Alkynes: General formula: C_nH_{2n-2} Suffix : yne
64. The hydrocarbons containing carbon to carbon triple bond are called alkynes.
65. Alkynes are named in the same way as alkenes i.e., by replacing suffix ane of alkane by yne.
66. Functional group may be defined as an atom or group of atoms or reactive part which is responsible for the characteristic properties of the compounds.
67. The chemical properties of organic compounds are determined by the functional groups.
68. Alcohols are carbon compounds containing –OH group attached to alkyl group.
69. The general formula of alcohol is R-OH where 'R ' is an alkyl group and –OH is the functional group.
70. The IUPAC name of alcohol is derived by replacing –e, in the word alkane, by the suffix – ol. Hence we get the name alkanol.
71. Aldehydes are carbon compounds containing -CHO group attached to alkyl group or hydrogen atom.
72. The general formula of aldehydes is R – CHO ('R' is an alkyl group or hydrogen atom and – CHO is the functional group).
73. The IUPAC name of aldehyde is derived by replacing –e, in the word alkane, by the suffix –al. Hence we get the name "alkanal".
74. Ketones are carbon compounds containing carbonyl – CO – group attached to two alkyl groups.

75. The general formula of ketone is R-CO-R' where R and R' are alkyl groups and – CO – is the functional group.
76. The IUPAC name of ketone is derived by replacing –e, in the word alkane, by the suffix -one. Hence we get the name "alkanone".
77. Carboxylic acids are carbon compounds containing –COOH group attached to a hydrogen atom or alkyl group.
78. The general formula of acid is R-COOH where 'R' is a hydrogen atom or alkyl group and –COOH is the functional group.
79. The IUPAC name of acid is derived by replacing – e, in the word alkane, by the suffix – oic acid. Hence we get the name "alkanoic acid".
80. Ethanol (C_2H_5OH) ethyl alcohol or alcohol is one of the most important members of the family of alcohols.
81. Ethanol is a clear liquid with burning taste.
82. Ethanol's boiling point is 351K.
83. Ethanol is completely miscible with water in all proportions.
84. Ethanol, when heated with excess conc. H_2SO_4 at 443 K undergoes intra molecular dehydration.
85. Ethanol reacts with sodium metal to form sodium ethoxide and hydrogen gas.
86. Ethanol is oxidized to ethanoic acid with alkaline $KMnO_4$ or acidified.
87. The slow chemical change taking place in an organic compound by the action of enzymes leading to the formation of smaller molecules is called fermentation.
88. When the vapour of ethanol is passed over reduced copper catalyst at 573 K, it is dehydrogenated to acetaldehyde.
89. Ethanol is used as an anti-freeze in automobile radiators.
90. Ethanol is used as a preservative for biological specimen.

91. Ethanol is used as an antiseptic to sterilize wounds in hospitals.
92. Ethanol is used as a solvent for drugs, oils, fats, perfumes, dyes, etc.
93. Ethanol is used in the preparation of methylated spirit (95% ethanol + 5% methanol), rectified spirit (95.5% ethanol+ 4.5% of water), power alcohol (petrol + ethanol) and denatured sprit (ethanol + pyridine).
94. Ethanol is used in cough and digestive syrups.
95. If ethanol is consumed, it tends to slow down metabolism of our body and depresses the central nervous system.
96. Ethanol causes mental depression and emotional disorder.
97. Ethanol affects our health by causing ulcer, high blood pressure, cancer, brain and liver damage.
98. Ethanol reacts with ethanoic acid in the presence of conc.H_2SO_4 (catalyst) to form ethyl ethanoate and water.
99. The compound formed by the reaction of an alcohol with carboxylic acid is known as ester (fruity smelling compound) and the reaction is called esterification.
100. Intake of methanol in very small quantities can cause death.
101. Methanol is oxidized to methanal (formaldehyde) in the liver.
102. Methanol also affects the optic nerve, causing blindness.
103. Ethanoic acid (CH_3COOH) - is most commonly known as acetic acid and belongs to a group of acids called carboxylic acids.
104. Acetic acid is present in many fruits and sour taste of fruits is because of this acid.
105. Ethanol on oxidation in the presence of alkaline potassium permanganate or acidified potassium dichromate gives ethanoic acid.
106. Ethanoic acid is a colourless liquid and has a sour taste.
107. Ethanoic acid is miscible with water in all proportions.
108. The boiling point of Ethanoic acid is (391K).

109. On cooling, pure ethanoic acid is frozen to form ice like flakes. They look like glaciers, so it is called glacial acetic acid.
110. Ethanoic acid is a weak acid but it turns blue litmus to red.
111. Ethanoic acid reacts with metals like Na, K, Zn, etc to form metal ethanoate and hydrogen gas.
112. Ethanoic acid reacts with carbonates and bicarbonates and produces brisk effervescence due to the evolution of carbon dioxide.
113. Ethanoic acid reacts with sodium hydroxide to form sodium ethanoate and water.
114. When sodium salt of ethanoic acid is heated with soda lime methane gas is formed.
115. Ethanoic acid is used in making vinegar which is used as a preservative in food and fruit juices.
116. Ethanoic acid is used as a laboratory reagent.
117. Ethanoic acid is used for coagulating rubber from latex.
118. Ethanoic acid is used in the preparation of dyes, perfumes and medicine.

15. Laws of motion and gravitation

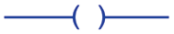
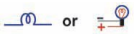
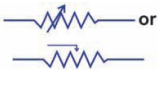
1. Force is one which changes or tends to change the state of rest or of uniform motion of a body.
2. Force is a vector quantity. Its SI unit is newton.
3. First law of motion - An object remains in the state of rest or of uniform motion in a straight line unless compelled to change that state by an applied unbalanced force.
4. The first law of motion is also known as the law of inertia.
5. The inability of a body to change its state of rest or of uniform motion by itself is called inertia.
6. Inertia of body depends mainly upon its mass.

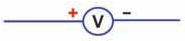
7. The momentum ‘p’ of an object is defined as the product of its mass ‘m’ and velocity ‘v’. That is p=mv.
8. Momentum has both direction and magnitude. It is a vector quantity. The SI unit of momentum is kg ms^{-1}.
9. Second la w of motion - the rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of force.
10. One unit of force (1N) is defined as the amount of force that produces an acceleration of 1 m s^{-2} in an object of 1 kg mass.
11. The second law of motion gives us a method to measure the force acting on an object as a product of its mass and acceleration.
12. Third la w of motion – for every action there is an equal and opposite reaction.
13. The force of attraction between objects is called the gravitational force.
14. Mass is the amount of matter present in a body.
15. Mass is a fundamental quantity. The unit of mass is kilogram.
16. Mass remains the same. Mass is measured using physical balance.
17. Weight is a derived quantity. Weight is the gravitational pull acting on the body.
18. Weight is measured in newton. Weight varies from place to place.
19. Weight is measured using spring balance.
20. Galileo was the first to make a systematic study of the motion of a body under the gravity of the Earth.
21. The velocity of a freely falling body under gravity increases at a constant rate.
22. The acceleration produced in a body on account of the force of gravity is called acceleration due to gravity. It is denoted by g.
23. Cryogenics is the study of the production of very low temperature (below 123k); and the behaviour of materials at those temperature.

24. A person who studies elements under extremely cold temperature is called a cryogen cist.
25. Cryogenics use the Kelvin scale of temperature.
26. Liquefied gases such as liquid nitrogen and liquid helium are used in many cryogenic applications.
27. Liquid nitrogen is the most commonly used element in cryogenics
28. Liquid helium is also commonly used and allows for the lowest attainable temperature to be reached.
29. Liquid nitrogen and liquid helium are held in special containers called Dewar flasks.
30. Liquid nitrogen is used for specially chilling and freezing applications.
31. The important use of cryogenics is cryogenic fuels.
32. Magnetic Resonance Imaging (MRI) is used to scan inner organs of human body.
33. Cryogenic gases are used in transportation of large masses of frozen food.
34. The freezing of biotechnology products like vaccines require nitrogen freezing systems.
35. A space station is an artificial structure designed for humans to live and work in outer space for a period of time.
36. The only space stations are Almaz and Salyut series, Sky lab and Mir.
37. Space stations are used to study the effects of long-space flight on the human body.
38. Space stations have been used for both military and civilian purposes.
39. The last military-used space station was Salyut 5, which was used by the Almaz program of the Soviet Union in 1976 and 1977.

16. ELECTRICITY AND ENERGY

1. Electricity is a controllable and convenient form of energy.
2. A switch makes a conducting link between the cell and the bulb.
3. A continuous and closed path of an electric current is called an electric circuit.

4. The S.I unit of electric charge is coulomb. This is equivalent to the charge contained in nearly 6×10^{18} electrons.
5. The electric current is expressed by a unit called ampere (A), named after the French Scientist.
6. Ammeter is used to measure current in a circuit.
7. Electric potential difference between two points in an electric circuit carrying some current as the work done to move a unit charge from one point to the other.
8. Potential difference (V) = work done (W) / charge (Q). [V = W/Q]
9. The S.I Unit of potential difference is volt (V). 1 volt = 1joule/1coulomb
10. One volt is the potential difference between two points in a current carrying conductor when 1 joule of work is done to move a charge of 1 coulomb from one point to the other.
11. The potential difference is measured by means of an instrument called voltmeter.
12. The Schematic diagram, in which different components of the circuit are represented by the symbols conveniently used, is called a circuit diagram.
13. Conventional symbol used to represent an electric cell 
14. Conventional symbol used to represent a battery / a combination of cells 
15. Conventional symbol used to represent plug key or switch (open) 
16. Conventional symbol used to represent plug key or switch (closed) 
17. Conventional symbol used to represent a wire joint 
18. Conventional symbol used to represent wires crossing without joining 
19. Conventional symbol used to represent electric bulb 
20. Conventional symbol used to represent a resistor of resistane R 
21. Conventional symbol used to represent variable resistance or rheostat 
22. Conventional symbol used to represent ammeter 

23. Conventional symbol used to represent voltmeter 
24. In 1827, a German Physicist George Simon Ohm found out the relationship between the current flowing in a metallic wire and the potential difference across its terminals.
25. Ohm's law states that at constant temperature the steady current (I) flowing through a conductor is directly proportional to the potential difference (V) between its ends. V□ I (or) V/I=constant.
26. Ohm's law, $V \propto I$, V = IR R is a constant and is called its resistance. Its S.I unit is ohm, Ω.
27. If the potential difference across the two ends of a conductor is 1volt and the current through it is 1ampere, then the resistance of the conductor is 1 ohm.
28. Resistors can be connected in series or in parallel.
29. The total potential difference across the combination of resistors in series is equal to the sum of potential difference across individual resistors. That is, $V=V_1+V_2+V_3$.
30. In parallel combination the potential difference across each resistor is the same having a value V.
31. Battery is a source of electrical energy. Its potential difference between the two terminals sets the electrons in motion to flow the current through the resistor.
32. The heat produced in a resistor is directly proportional to the square of current for a given resistance.
33. The heat produced in a resistor is directly proportional to the resistance for a given current
34. The heat produced in a resistor is directly proportional to the time for which the current flows through the resistor.
35. A common application of joules heating is the fuse used in electric circuits.
36. The fuse consists of a piece of wire made of metal or an alloy (37% lead, 63% tin).

37. Fuse has high resistance and low melting point.
38. Over loading can occur when the live wire and the neutral wire come onto direct contact.
39. Over loading makes the current in the circuit abruptly increases. This is called short circuiting.
40. The SI unit of electric power is watt (W). It is the power consumed by a device.
41. The commercial unit of electric energy is kilowatt hour (kWh) – 'unit ' .
42. When the current is passed through aqueous solutions of inorganic acids, bases and salts, causes chemical decomposition of the solutions (electrolytes).
43. The phenomenon of the conduction of electricity through electrolytes and chemical decomposition is called electrolysis.
44. The cells in which the electrical energy is derived from the chemical action are called electrochemical cells.
45. Voltaic cell consists of two electrodes, one of copper and the other of zinc dipped in a solution of dilute sulphuric acid.
46. A simple cell is a device which converts chemical energy into electrical energy.
47. Primary cell is the cell from which the electric energy is derived by irreversible chemical reaction.
48. The main primary cells are Daniel cell and Leclanche cell. These cells cannot be recharged.
49. In Leclanche cell ammonium chloride solution is acting as electrolyte.
50. In Leclanche cell, carbon rod forms the positive pole and the zinc rod the negative pole.
51. The e.m.f of freshly charged cell is 2.2V.
52. Secondary cells are rechargeable.
53. The chemical reactions that take place in secondary cells are reversible.
54. The chemical process of obtaining current from a secondary cell is called discharge.

55. The process of reproducing active materials is called charging.
56. One of the most commonly used secondary cell is lead acid accumulator.
57. In a lead-acid accumulator, the anode and cathode are made of lead and lead dioxide respectively. In a lead-acid accumulator, the electrolyte is dilute sulphuric acid.
58. The growing demand for energy was largely met by the fossil fuels, coal and petroleum.
59. The fossil fuels are non-renewable sources of energy.
60. Burning fossil fuels has other disadvantages like air pollution, acid rain and production of green house gases.
61. The phenomenon of radioactivity was discovered by Henri Becquerel in 1896.
62. Madame Marie Curie and her husband Pierre Curie discovered the highly radioactive elements radium and polonium.
63. Elements having atomic number greater than 82 is called radioactivity.
64. In 1939, German scientists Otto Hahn and Strassman discovered nuclear fission.
65. Nuclear fusion is a process in which two or more lighter nuclei combine to form a heavier nucleus.
66. The nuclear fusion reactions are known as thermo nuclear reactions.
67. The radiation exposure is measured by the unit called roentgen(R).
68. One roentgen is defined as the quantity of radiation which produces 1.6×10^{12} pairs of ion in 1 gram of air.
69. Safe limit of receiving the radiation is about 250 milli roentgen per week.
70. Radioactive materials are kept in thick-walled lead container.
71. Lead aprons and lead gloves are used while working in hazardous area.
72. A small micro-film badge is always worn by the person and it is checked periodically for the safety limit of radiation.
73. Nuclear devices can be operated using remote control system.

17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

1. The region surrounding the magnet, in which the force of the magnet can be detected, is said to have a magnetic field.
2. The lines along which the iron fillings align themselves represent magnetic lines of force.
3. Magnetic field is a quantity that has both magnitude and direction.
4. The magnitude of the magnetic field produced at a given point increases as the current through the wire, increases.
5. The magnetic field produced by the given current in the conductor decreases as the distance from it increases.
6. The magnetic field produced by a current- carrying straight wire depends inversely on the distance.
7. The magnetic field produced by a current- carrying conductor at a given point, depends directly on the current passing through it.
8. An electric current flowing through a conductor produces a magnetic field.
9. The direction of force on the conductor depends upon the direction of current and the direction of magnetic field.
10. The direction of the current and that of the magnetic field perpendicular to each other.
11. An electric motor is a rotating device that converts electrical energy in to mechanical energy.
12. A device that reverses the direction of flow of current through a circuit is called a commutator.
13. In electric motors, the split ring acts as a commutator.
14. The soft iron core, on which the coil is wound, plus the coils, is called an armature. Armature enhances the power of the motor.

15. Faraday in1831 discovered that an electro motive force is produced in a circuit whenever the magnetic flux linked with a coil changes.
16. The emf generated by the relative motion between the conductor and a magnetic field. is called an induced emf and the phenomenon is known as electro magnetic induction.
17. The induced emf will cause a current to flow through the conductor. Such a current is known as induced current.
18. Faraday made an important break through by discovering how a magnet can be used to generate electric currents.
19. The phenomenon of electro magnetic induction is employed to produce large currents for use in homes and industry.
20. In an electric generator, mechanical energy is used to rotate a conductor in a magnetic field to produce electricity.
21. The laws of reflection of light - The angle of incidence is equal to the angle of reflection, and the incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.
22. The curved surface of a shining spoon could be considered as a curved mirror.
23. The most commonly used type of curved mirror is the spherical mirror.
24. The reflecting surface of a spherical mirror may be curved inwards or outwards.
25. A spherical mirror whose reflecting surface is curved inwards is called a concave mirror.
26. A spherical mirror whose reflecting surface is curved outwards is called a convex mirror.
27. The centre of the reflecting surface of a spherical mirror is a point, called the pole. It is represented by the letter P.
28. The centre point of the reflecting surface of a spherical mirror forms the centre of curvature. It is represented by the letter C.
29. The radius of the sphere of which the reflecting surface of a spherical mirror forms a part, is called the radius of curvature of the mirror. It is represented by the letter R.

30. The straight line passing through the pole and the centre of curvature of a spherical mirror is called the principle axis.
31. The distance of the image from the position of the mirror gives the approximate focal length of the mirror.
32. A number of rays parallel to the principal axis are reflected and meet at a point on the principal axis of the mirror (**principal focus**).
33. In a convex mirror, the reflected rays appear to come from a point on the principal axis. (**Principal focus**).
34. The principal focus is represented by the letter F.
35. The distance between the pole and the principal focus of a spherical mirror is called the focal length. It is represented by the letter f.
36. The diameter of the reflecting surface of spherical mirror is called its aperture.
37. Spherical mirrors of small apertures the radius of curvature is found to be equal to twice the focal length. We put this as R = 2f.
38. In a concave spherical mirror, a ray parallel to the principal axis, after reflection, will pass through principal focus.
39. In a convex spherical mirror, a ray parallel to the principal axis, after reflection, appear to diverge from the principal focus.
40. A ray passing through the principal focus of a concave mirror or a ray directed towards the principal focus of a convex mirror, after reflection, will emerge parallel to the principal axis.
41. A ray passing through the centre of curvature of a concave mirror or directed in the direction of the centre of curvature of a convex mirror, after reflection, is reflected back along the same path.
42. Concave mirrors are commonly used in torches, search-lights and vehicles head lights to get powerful parallel beams of light.

43. Concave mirrors are used as shaving mirrors to see a lager image of the face.
44. The dentists use concave mirrors to see large images of the teeth of patients.
45. Large concave mirrors are used to concentrate sun light to produce heat in solar furnaces.
46. Convex mirrors are commonly used as rear-view mirrors in vehicles.
47. In a spherical mirror, the distance of the object from its pole is called the object distance (u).
48. The distance of the image from the pole of the mirror is called the image distance (v).
49. The distance of the principal focus from the pole is called the focal length (f).
50. The mirror formula is expressed as $1/v + 1/u = 1/f$.
51. It appears that when traveling obliquely from one medium to another, the direction of propagation of light in the second medium changes. This phenomenon is known as refraction of light.
52. Refraction of light is due to change in the speed of light as it enters from one transparent medium to another.
53. The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
54. The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction.
55. If i is the angle of incidence and r is the angle of refraction, then, Sin i /sin r = constant
56. This constant value is called the refractive index of the second medium with respect to the first.
57. Light travels the fastest in vacuum with the highest speed of 3×10^8 m s^{-1}.

58. A transparent material bound by two surfaces, of which one or both surfaces are spherical, forms a lens.
59. A lens may have two spherical surfaces, bulging outwards. Such a lens is called a double convex lens. It is simply called a convex lens.
60. Convex lens converges light rays. Hence it is called converging lens.
61. A double concave lens is bounded by two spherical surfaces, curved inwards.
62. Double concave lenses diverge light rays and are called diverging lenses.
63. A double concave lens is simply called a concave lens.
64. The centre of curvature of a lens is usually represented by the letter C. (C1 and C2).
65. An imaginary straight line passing through the two centers of the curvature of a lens is called its principal axis.
66. The central point of a lens is called its optical centre.
67. Optical centre is represented by the letter O.
68. A ray of light through the optical centre of a lens passes without suffering any deviation.
69. The effective diameter of the circular outline of a spherical lens is called its aperture.
70. Lenses whose aperture is much less than its radius of curvature are called thin lenses with small aperture.
71. Parallel rays falling on a convex lens, get refracted and converge to a point on the principal axis. This point is called the principal focus of the convex lens.
72. Parallel rays falling on a concave lens, get refracted and diverge from a point on the principal axis. This point is called the principal focus of the concave lens.
73. The distance of the principal focus from the optical centre of a lens is called its focal length (f).
74. The SI unit of power of a lens is ‘dioptre’. It is denoted by the letter D.
75. 1 dioptre is the power of a lens whose focal length is 1 meter.
76. The power of a convex lens is positive and that of a concave lens is negative.

77. The band of the coloured component of a light beam is called its spectrum.
78. The hotter air is lighter (less dense) than the cooler air.
79. The hotter air has a refractive index slightly less than that of the cooler air.
80. In human eve, the lens system forms an image on a light sensitive screen called the retina.
81. Light enters the eye through the thin membrane called the cornea.
82. Cornea forms the transparent bulge on the front surface of the eye ball.
83. The eye ball is approximately spherical in shape with a diameter of about 2.3cm.
84. Most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea.
85. Iris is seen behind the cornea.
86. Iris is a dark muscular diaphragm that controls the pupil.
87. The pupil regulates and controls the amount of light entering the eye.
88. The eye lens forms an inverted real image of the object on the retina.
89. The retina is a delicate membrane having enormous number of light-sensitive cells.
90. The three common refractive defects of vision are Myopia or near – sightedness, Hypermetropia or far-sightedness and Presbyopia.
91. A person with myopia can see near by objects clearly but cannot see the distant objects distinctly.
92. In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself.
93. Myopia arisez due to excessive curvature of the eye lens or elongation of the eyeball.
94. Myopia can be corrected by using a concave lens of suitable power.
95. A person with hypermetropia can see distant objects clearly but cannot see near by objects distinctly.
96. The normal near point is 25 cm.

97. In hypermetropia, the light rays from a close by object are focused at a point behind the retina.
98. Hypermetripia arises if the focal length of the eye lens is too long or the eyeball has become too small.
99. Hypermetripia can be corrected by using a convex lens of appropriate power.
100. The power of accommodation of the eye usually decreases with ageing.
101. Because of aging people find it difficult to see near by objects comfortably and distinctly. This defect is called Presbyopia.
102. Presbyopia arises due to the gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.
103. For a person suffering from both myopia and hypermetropia, requires by-focal lenses.
104. A common type of by-focal lenses consists of both concave and convex lenses.
105. In a bifocal lens, the upper portion consists of a concave lens.
106. H.S.T – Hubble space telescope.
107. Hubble telescope is a space telescope that was carried into orbit by a space shuttle in April 1990.
108. H.S.T is named after the American astronomer Edwin Hubble.
109. H.S.T becomes a most popular research tool for astronomy.
110. The H.S.T is collaboration between NASA and the European Space Agency, and is one of NASA ' s great observatories.
111. Hubble is the only telescope ever designed to be serviced in space by astronauts.
112. The H.S.T design with two hyperbolic mirrors is known for good imaging performance over a wide field of view.
113. After a servicing mission in 1993, the telescope was restored to its intended quality.
114. Four servicing missions where performed from 1993-2002.

115. The fifth was completed in 2009. The telescope is now expected to function until at least 2014.
116. Hubble Deep field and Hubble ultra Deep field images reveals that galaxies are billions of light years away.
117. Many Hubble observations accurately measure the rate at which the universe is expanding.
118. It constrains the value of Hubble's constant and estimates the age of the Universe.
119. Hubble's images of planets were crucial in studying the dynamics of the collision of a comet with Jupiter, an event believed to occur once every few centuries.
120. Hubble's observations found that black holes are common to the centers of all galaxies.
121. The astronomers used the telescope to observe distant supernovae.

ALL THE BEST CHILDREN

VALGA VALAMUDAN