1. The periodic table organizes elements by increasing atomic number and similar properties.
2. Ionic bonds form between metals and nonmetals.
3. Covalent bonds share electrons between nonmetal atoms.
4. Polar molecules have an uneven distribution of charge.
5. The mole concept relates the mass of a substance to the number of particles.
6. Activation energy is required to start a chemical reaction.
7. Catalysts speed up chemical reactions without being consumed.
8. Equilibrium is achieved when the rates of the forward and reverse reactions are equal.
9. Le Chatelier's Principle predicts the effect of a change on a system at equilibrium.
10. Solubility rules determine which compounds dissolve in water.
11. The structure of the atom includes a nucleus composed of protons and neutrons, surrounded by electrons.
12. Different isotopes of an element have the same number of protons but different numbers of neutrons.
13. The octet rule guides the formation of chemical bonds.
14. Endothermic reactions absorb energy, while exothermic reactions release energy.
15. The concept of molarity measures the concentration of a solution.
16. Buffer solutions resist changes in pH when small amounts of acid or base are added.
17. The ideal gas law relates the pressure, volume, temperature, and number of moles of a gas.
18. Transition metals can form complexes with specific colors.
19. Enthalpy changes indicate the heat absorbed or released in a reaction.
20. The rate of a chemical reaction can be influenced by temperature, concentration, surface area, and the presence of a catalyst.
21. Alloys are mixtures of metals that have different properties from their component elements.
22. Distillation separates substances based on differences in boiling points.
23. Acid-base titrations determine the concentration of an acid or base in a solution.
24. Electronegativity differences between atoms lead to bond polarity.
25. The periodic table trends include atomic radius, ionization energy, and electron affinity.
26. Hydration shells form when ions dissolve in water.
27. Redox reactions involve the transfer of electrons between species.
28. The solubility product constant (Ksp) predicts the solubility of ionic compounds.
29. Dalton’s law of partial pressures describes the pressure contributions of individual gas components in a mixture.
30. Molecular geometry affects the physical and chemical properties of substances.
31. Phase diagrams illustrate the conditions of temperature and pressure under which different phases of a substance exist.
32. The Henderson-Hasselbalch equation relates pH, pKa, and buffer concentrations.
33. Chromophores and auxochromes influence the color of organic compounds.
34. The common ion effect influences the solubility of ionic compounds in solution.
35. Fractional crystallization separates compounds based on differences in solubility.
36. Raoult's law relates the vapor pressure of a solution to the mole fraction of the solvent.
37. The kinetic molecular theory explains the behavior of gases in terms of particle motion.
38. Ligands bind to central metal atoms in coordination compounds.
39. The Beer-Lambert law relates the absorption of light to the properties of the material through which the light is traveling.
40. Galvanic cells produce electrical energy from spontaneous redox reactions.
41. Electrophoresis separates DNA fragments by size.
42. The Tyndall effect demonstrates the scattering of light by colloidal particles.
43. Supercooling water allows it to remain liquid below its normal freezing point.
44. The extraction of metals from ores involves chemical reduction processes.
45. The structure of proteins is determined by amino acid sequences and chemical bonding.
46. Surfactants reduce surface tension, allowing liquids to spread or emulsify.
47. The Corrosion of metals involves electrochemical reactions.
48. Osmosis is the movement of water through a semipermeable membrane from low to high solute concentration.
49. Polymorphism in chemistry refers to the ability of a solid material to exist in more than one form or crystal structure.
50. The viscosity of a liquid measures its resistance to flow.
51. Liquid crystals display unique properties that make them useful in electronic displays.
52. Soap molecules have both hydrophilic and hydrophobic ends, allowing them to remove grease.
53. The Haber process synthesizes ammonia from nitrogen and hydrogen gases under high pressure and temperature.
54. The color of fireworks is determined by the chemical elements they contain.
55. Acid rain results from the dissolution of sulfur dioxide and nitrogen oxides in water vapor in the atmosphere.
56. Catalytic converters in cars reduce harmful emissions by facilitating chemical reactions.
57. The Rutherford gold foil experiment provided evidence for the existence of a small, dense atomic nucleus.
58. Geiger counters detect radioactive decay through ionization.
59. The concept of chemical equilibrium applies to reactions where the forward and reverse reactions occur at the same rate.
60. The Van der Waals force is a weak attraction between molecules close to each other.
61. The London Dispersion Force is a weak intermolecular force that increases with the size of the molecule.
62. The electrolysis of water produces hydrogen and oxygen gases.
63. Chirality in molecules refers to a property where the molecule and its mirror image are not superimposable.
64. The use of stabilizers in food helps to maintain its texture and prolongs shelf life by preventing chemical reactions.
65. The Michelson-Morley experiment was crucial in the development of the theory of special relativity, impacting our understanding of time and space at the atomic level.
66. Nitration reactions are used in the synthesis of explosives and dyes.
67. The principle of microscale chemistry reduces waste and exposure to hazardous chemicals.
68. Zeeman effect demonstrates the splitting of spectral lines under the influence of a magnetic field, revealing the interaction between light and magnetic fields.
69. The Brønsted-Lowry theory defines acids and bases in terms of their ability to donate or accept protons.
70. The formation of esters through the reaction between carboxylic acids and alcohols is known as esterification, responsible for many fruit and flower aromas.
71. Fluorescence occurs when a substance absorbs light at one wavelength and emits light at a longer wavelength.
72. The Clausius-Clapeyron equation relates the vapor pressure of a substance to its temperature.
73. A buffer solution maintains a relatively constant pH even when small amounts of acid or base are added.
74. Enantiomers are mirror-image molecules that cannot be superimposed on each other.
75. The Gibbs phase rule describes the possible phases for a given system at equilibrium.
76. Ostwald ripening explains the growth of large particles at the expense of smaller ones in a solution.
77. The concept of molality involves the concentration of a solution expressed as moles of solute per kilogram of solvent.
78. Electrophilic aromatic substitution is a common method for modifying benzene rings.
79. The Hall-Héroult process is essential for producing aluminum from its oxide.
80. The extraction of caffeine from tea leaves involves organic solvents.
81. Electrolytic cells use electrical energy to drive non-spontaneous chemical reactions.
82. The rate of a chemical reaction can be affected by the presence of catalysts.
83. Isomers are compounds with the same molecular formula but different structures and properties.
84. The colligative properties of solutions depend on the number of solute particles, not their identity.
85. The Henderson-Hasselbalch equation is used to calculate the pH of buffer solutions.
86. Spectrophotometry measures the intensity of light absorbed by a solution to determine the concentration of a solute.
87. The principle of Le Chatelier's predicts how a system at equilibrium responds to changes in concentration, temperature, or pressure.
88. Fischer esterification is a method to synthesize esters from carboxylic acids and alcohols.
89. The solubility of gases in liquids decreases with increasing temperature.
90. Raoult's Law describes how the vapor pressure of a solvent is lowered by the addition of a non-volatile solute.
91. Chromatography separates components of a mixture based on differences in their movement through a stationary phase.
92. The principle of conservation of mass is fundamental to the stoichiometry of chemical reactions.
93. The discovery of the electron led to the development of the atomic model.
94. Dissociation is the process by which molecules (or ionic compounds) break apart into smaller particles such as atoms, ions, or radicals, usually in a reversible manner.
95. The concept of molar volume relates the volume of a gas to the amount of substance at a given temperature and pressure.
96. Activation energy is the minimum energy required to initiate a chemical reaction.
97. The Arrhenius equation provides a quantitative basis for the temperature dependence of reaction rates.
98. The Born-Haber cycle is a series of hypothetical steps that represents the formation of an ionic compound from its constituent elements.
99. The concept of molecular orbital theory explains the bonding in molecules by the combination of atomic orbitals to form molecular orbitals.
100. The law of definite proportions states that a chemical compound always contains exactly the same proportion of elements by mass.
101. Isotope fractionation occurs during physical and chemical processes, altering the ratio of isotopes.
102. The principle of dynamic equilibrium applies to both chemical reactions and phase changes.
103. The electroplating process deposits a metal coating on an object by using an electric current.
104. Vapor pressure lowering is a colligative property observed when a nonvolatile solute is dissolved in a solvent.
105. The optical activity of substances is measured by their ability to rotate the plane of polarized light.
106. The Hall effect provides insight into the behavior of electrons in a conductor.
107. Hydrophobic and hydrophilic interactions play crucial roles in the structure and function of biological molecules.
108. The synthesis of biodiesel involves the transesterification of vegetable oils or animal fats.
109. Molecular sieves are materials with pores of uniform size used in gas purification or separation.
110. The concept of chemical hardness relates to the resistance of an atom or molecule to change its electron density.
111. The viscosity of a fluid describes its resistance to gradual deformation by shear or tensile stress.
112. Superconductivity is a phenomenon where a material can conduct electricity without resistance below a certain temperature.
113. The lanthanide contraction refers to the gradual decrease in the size of lanthanide ions from lanthanum to lutetium.
114. Piezoelectric materials generate an electrical charge in response to applied mechanical stress.
115. The Gibbs free energy equation predicts the spontaneity of a process at constant temperature and pressure.
116. Polymorphs are substances that exhibit more than one crystal form.
117. The process of elution is used in chromatography to separate compounds based on their interaction with the stationary phase.
118. Zeolites are used as catalysts and molecular sieves because of their unique porous structures.
119. The Nernst equation relates the cell potential of an electrochemical cell to the concentration of the reactants and products.
120. The concept of redox potential is crucial in understanding the tendency of a chemical species to acquire electrons and thereby be reduced.
121. The Bragg equation relates the angles at which X-rays are diffracted by crystal lattices to the lattice spacings.
122. Enthalpy changes in chemical reactions can be measured using a calorimeter.
123. The principle of quantum confinement explains the size-dependent properties of nanoparticles.
124. Conductive polymers exhibit electrical properties similar to metals and semiconductors.
125. Stereoisomers have the same molecular formula but differ in the spatial arrangement of atoms.
126. The Debye-Hückel theory explains how ionic strength affects the activity coefficients of electrolytes in solution.
127. Chemisorption involves the chemical bonding of adsorbate molecules to the surface of a material.
128. The use of sacrificial anodes protects metals from corrosion through galvanic action.
129. The phase rule, F=C-P+2, relates the degrees of freedom (F), components (C), and phases (P) in a system.
130. Fenton's reagent is used for the oxidation of organic compounds in wastewater treatment.
131. Liquid crystals found in displays change orientation in response to electric fields, affecting their optical properties.
132. The Geiger counter detects ionizing radiation by measuring the ionization of a gas within a Geiger-Müller tube.
133. Eutrophication in water bodies is caused by the overabundance of nutrients, leading to excessive growth of algae.
134. The concept of isoelectric point refers to the pH at which a molecule carries no net electric charge.
135. Adsorption is a process where molecules from a gas or liquid adhere to the surface of a solid.
136. The synthesis of aspirin from salicylic acid involves an esterification reaction.
137. Capillary action allows water to climb up narrow tubes against the force of gravity.
138. The van't Hoff factor describes the effect of solutes on the colligative properties of solutions.
139. Catalytic cracking breaks down larger hydrocarbon molecules into smaller ones using a catalyst.
140. The protective ozone layer is primarily located in the stratosphere, absorbing the majority of the sun's harmful ultraviolet radiation.
141. The separation of isotopes by laser excitation is based on differences in their atomic mass.
142. Thermochromic materials change color with temperature due to changes in their molecular structure.
143. The triple point of a substance is the temperature and pressure at which it can exist in equilibrium in the solid, liquid, and gas phases.
144. The formation of soap scum results from the reaction of soap with calcium and magnesium ions in hard water.
145. Biodegradable plastics are designed to decompose under specific conditions, aided by the action of microorganisms.
146. Supersaturated solutions are unstable and can crystallize rapidly when a seed crystal is introduced.
147. The Tyndall effect is the scattering of light by particles in a colloid, making the light beam visible.
148. The electrolysis of brine (saltwater) produces chlorine gas, hydrogen gas, and sodium hydroxide.
149. The Leidenfrost effect occurs when a liquid, in near contact with a mass significantly hotter than the liquid's boiling point, produces an insulating vapor layer keeping that liquid from boiling rapidly.
150. Chemoluminescence is a chemical reaction that releases energy in the form of light.
151. The rate of a chemical reaction can be influenced by factors such as temperature, concentration, surface area, and the presence of catalysts.
152. Chelation therapy involves the use of chelating agents to remove heavy metals from the body.
153. The color of a substance is often determined by the wavelengths of light it absorbs.
154. Buffer solutions resist changes in pH when small amounts of acid or base are added, maintaining a stable pH.
155. The concept of electronegativity explains the tendency of an atom to attract a bonding pair of electrons.
156. Fractional distillation separates mixtures into their component parts based on differences in boiling points.
157. The presence of impurities can lower the melting point and raise the boiling point of a substance.
158. Saponification is the hydrolysis of fats or oils with an alkali, producing glycerol and soap.
159. Hard water contains high levels of calcium and magnesium, which can interfere with the action of soap and form scale.
160. The Henderson-Hasselbalch equation is used to estimate the pH of a buffer solution.