Solutions

S1. Ans.(b)

Sol. When atoms lose or gain electrons in order to fulfill the octet rule and have full outer valence electron shells. When they lose electrons, they become positively charged and are named cations. When they gain electrons, they are negatively charged and are named anions.

S2. Ans.(c)

Sol. When they gain electrons, they are negatively charged and are named anions.

S3. Ans.(a)

Sol. An ionic bond is a type of chemical bond formed through an electrostatic attraction between two oppositely charged ions.

S4. Ans.(b)

Sol. A covalent bond, also called a molecular bond, is a chemical bond that involves the sharing of electron pairs between atoms.

S5. Ans.(c)

Sol. $CaCl_2$ is an ionic bond. This is because the calcium gives up an electron to each of the chlorine atoms resulting in the calcium becoming Ca^{2+} ions while the chlorine forms Cl^- ions. These ions then come together through electrostatic attraction because they have opposite charges to form $CaCl_2$.

S6. Ans.(d)

Sol. Ionic bonds between NH_{+4} and Cl^{-1}, N makes three covalent bonds with three Hydrogen and coordinate with one hydrogen ion (H+) to form ammonium ion which is NH4+ which forms an ionic bond with chloride ion to form NH_4Cl. Thus it has all the three bonds known as ionic ,coordinate and covalent bond.

S7. Ans(c)

Sol. A nitrogen atom can fill its octet by sharing three electrons with another nitrogen atom, forming three covalent bonds, a so-called triple bond.

S8. Ans(c)

Sol. Ethylene is a hydrocarbon which has the formula C_2H_4 or $H_2C = CH_2$.

It is a colorless flammable gas with a faint "sweet and musky" odour when pure.

S9. Ans(b)
Sol. The reason that it is paramagnetic is because the oxygen molecule has two unpaired electrons.

S10. Ans(b)
Sol. In the molten state, ions in ionic compounds are free to flow and therefore molten sodium chloride can conduct electricity.

S11. Ans.(d)
Sol. The net flux will be zero as the electric field lines entering the negative end of the dipole will be exactly cancelled by the electric field lines leaving the positive end of the dipole.

S12. Ans.(b)
Sol.
Induced charge does not depend upon time of change of magnetic flux,
as Induced charge Q = $n\Delta T\emptyset R$

S13. Ans.(c)
Sol. According to Lenz law, the polarity of the induced emf is such that it opposes the change in magnetic flux responsible for its production.

S14. Ans.(c)
Sol. Magnetic field is produced both by a moving charge and change in electric field

S15. Ans.(d)
Sol. Ohm is the SI unit of electrical resistance. 1 ohm is define as the resistance of a conductor when a potential difference of 1 volt is applied to its ends when a current of 1 ampere flows through it

S16. Ans.(a)
Sol. The magnetic field inside a long straight solenoid carrying current is uniform at all points.

S17. Ans.(a)
Sol. Heating coils are commonly made up of metal alloys which are a combination of two or more elements. The most commonly used metal alloy is "Nichrome". Nichrome is an alloy of nickel (80%) and chromium (20%).

S18. Ans.(d)
Sol. Mechanical energy is the ability of an object to do work. This energy is equal to the sum of kinetic and potential energy, it is always constant.

S19. Ans.(b)
Sol. Transformer is based on the principle of mutual induction.

S20. Ans.(b)
Sol. Pressure is normal force per unit area, therefore, for lesser value of area pressure is greatest.

S21. Ans(c)
Sol. Both of elements of 1st period contains valence electrons in K shell.

S22. Ans(d)
Sol. Helium is the second element on the periodic table. It is located in period 1 and group 18 or 8A on the righthand Top side of the table.

S23. Ans(c)
Sol. Across period atomic size decreases due to Increase in nuclear force of attraction.

S24. Ans(b)
Sol. First three periods are Short periods.

S25. Ans(b)
Sol. The chemical properties of elements depend on an element's electron configuration. When the highest occupied energy level of an atom is filled with electrons, the atom is stable and not likely to react. The chemical properties of an element depend on the number of valence electrons.

S26. Ans(a)
Sol. Physical properties depends on the Size of atom.

S27. Ans(a)
Sol. The vertical columns (groups) of the periodic table are arranged such that all its elements have the same number of valence electrons. All elements within a certain group thus share similar properties.

S28. Ans(a)
Sol. As we go from left to right across period, electron affinity Increases.

S29. Ans(c)
Sol. A table in which the chemical elements are arranged in order of increasing atomic number. Elements with similar properties are arranged in the same column (called a group), and elements with the same number of electron shells are arranged in the same row (called a period).

S30. Ans(b)
Sol. The shielding effect can be defined as a reduction in the effective nuclear charge on the electron cloud, due to a difference in the attraction forces on the electrons in the atom. It is a special case of electric-field screening.

S31. Ans.(b)

Sol. Diamonds have a very high refractive index (about 2.42 compared to about 1.5 for glass). The amount of light reflected at an air/other material interface is related to the refractive index charge at the interface and the bigger the refractive index change, the more light is reflected. Thus, diamond reflects large amount of light and therefore, sparkles more.

S32. Ans.(b)

Sol. Butter paper is a translucent object as it allows light to pass through it partially, thus not providing clear vision. While, a transparent substance allows light to pass through it completely providing a clear vision. Whereas, an opaque substance is impenetrable to light. On the other hand, luminous objects emit their own light.

S33. Ans.(c)

Sol. A vibrating body will produce sound which is dependent upon the frequency. Sounds of frequencies less than about 20 vibrations per second (20 Hz) cannot be detected by the human ear. Such sounds are called inaudible. On the higher side, sounds of frequencies higher than about 20,000 vibrations per second (20 kHz) are also not audible to the human ear.

S34. Ans.(b)

Sol. SONAR or sound Navigation and Ranging is helpful for exploring and mapping the ocean because sound waves travel farther in the water than do radar and light waves. These also determine the time between the emission of sound pulse and its reception, the transducer can determine the range and orientation of the object.

While, LASER is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. Whereas, sonic boom is the sound associated with the shock waves created by an object travelling through the air faster than the speed of sound. On the other hand, reverberation is the prolongation of a sound.

S35. Ans.(d)

Sol. Mirage is an optical illusion. The reason of mirage is total internal reflection of light. In summer air near the ground is hotter and hence rarer than the air above which is responsible for TIR, hence, mirage is formed.

S36. Ans.(b)

Sol. Wavelength is the distance between two points of the wave in the same phase. It is related to frequency and energy of the radiations. It helps in determining colour of light waves. The wavelength of light visible to eye falls between 400nm to 800nm.

S37. Ans.(a)

Sol. Ultrasonics are sound waves of frequency greater than 20,000 Hz. The frequency range 20Hz to 20,000 Hz is human audible range of frequency.

S38. Ans.(d)

Sol. Laser (Light Amplification by Stimulated Emission of Radiation) is a device for producing stimulated radiation. In stimulated radiation, an incoming photon of a specific frequency can interact with an excited atomic electron causing creation of a new photon identical in all respect to the incident photon.

As a result, two similar waves (original incident wave and the newly formed one) constructively interfere, leading to a more intense wave.

S39. Ans.(a)

Sol. Infrared is used in the remote control of a television. It has wavelength greater than visible light (>800nm) which is invisible to human eye but can be felt as heat.

S40. Ans.(d)

Sol. One unit of electrical energy

= 1 kwh.

= 1 kilo watt hour

$= \frac{100}{1000} kilo$ watt × 4 hour

= 0.4 unit

S41. Ans.(b)

Sol. Glycogen is a multibranched polysaccharide of glucose that serves as a form of energy storage in humans, animals, fungi, and bacteria. The polysaccharide structure represents the main storage form of glucose in the body.

S42. Ans.(c)

Sol. Prevention of heat is attributed to the Rate of heat production.

S43. Ans.(b)

Sol. Diabetic people need to Reduce water intake.

S44. Ans.(d)

Sol. Condensation of glucose molecules ($C_6H_{12}O_6$) results in Glucagon.

S45. Ans.(d)

Sol. When water acts as a reactant, such as in a hydrolysis reaction, the electron-rich oxygen will serve as a nucleophile.

S46. Ans.(c)

Sol. Sucrose is common table sugar. It is a disaccharide, a molecule composed of two monosaccharides: glucose and fructose. Sucrose is produced naturally in plants, from which table sugar is refined. It has the formula $C_{12}H_{22}O_{11}$.

S47. Ans.(b)

Sol. The emulsion test is a method to determine the presence of lipids using wet chemistry. The procedure is for the sample to be suspended in ethanol, allowing lipids present to dissolve (lipids are soluble in alcohols). The liquid (alcohol with dissolved fat) is then decanted into water.

S48. Ans.(c)

Sol. Hemoglobin, also spelled haemoglobin, iron-containing protein in the blood of many animals in the red blood cells (erythrocytes) of vertebrates that transports oxygen to the tissues. Each hemoglobin molecule is made up of four heme groups surrounding a globin group, forming a tetrahedral structure.

S49. Ans.(c)

Sol. Thyroxine hormone is produced in the thyroid gland from tyrosine and iodine. Thyrotropin-releasing hormone (TRH) is produced by the hypothalamus. It stimulates the production of thyroid-stimulating hormone (TSH) in the anterior pituitary gland, which affects the thyroid-stimulating hormone receptor (TSHR).

S50. Ans.(a)

Sol Most of animal fats are Saturated fats, A saturated fat is a type of fat in which the fatty acid chains have all or predominantly single bonds.