Atomic structure and chemical bonding class 9 icse pdf

ICSE Selina Solution for Class 9 Chemistry Chapter 4 Atomic Structure and Chemical Communication provided here directs students to their ICSE Grade 9 exam. This learning material helps students understand concepts completely by providing an in-depth answer to all the exercise questions presented in Selina's ICSE Class 9 publishing tutorial. Selina Solutions for Grade 9 Chemistry is an important resource material because it deals with the main topics of atomic structure and chemical communication. This chapter is very important to understand the topics of physical chemistry in higher education institutions. The brief ICSE solutions presented here shed light on the structure of the atom, the mass number, the atomic number, the Octet rule. This solution will help you understand the components of atoms, the distribution of electrons in orbits, electrovalent and covalent connections. Important topics Affected in ICSE Selina Solution for Class 9 Chemistry Chapter 4 Definition of Atom Discovery Of Atom Opening of Protons Discovery of the Nucleus Bora Atomic Model Discovery of Neutrons Structure of the Atomic Electron Distribution In Orbits- Bor-Bury Scheme Valens Electrons Cause Chemical Activity of the Isotope Atom Ion Electrovalent) Bond Kovalent (Molecular) Bond Download PDF ICSE Selina Solution for Class 9 Chemistry Chapter 4 Atomic Structure and Chemical Communication Access Answers Selina Publishing ICSE Class 9 Chemistry Chapter 4 Atomic Structure and Chemical Bonding Exercise :4 A 1. What is the contribution of the following to the atomic structure? a) Maharshi Canada (b) Democrit? Solution: (a) Maharshi Canada gave an idea of the smallest units of matter. According to him, matter consisted of indestructible tiny particles called paramans, which are now called atoms. He also gave the concept of a molecule. b) Democritus is called paramanu as an atom, which comes from the Greek word atomos meaning indivisible. 2. Atomic theory of the state of Dalton. Solution: Dalton's atomic theory claims that atoms are indivisible particles that are the main building blocks of matter. He argues that the existence of different types of matter is due to different types of atoms. The basic tenets of Dalton's atomic theory: Matter consists of very small and indivisable particles called atoms. Atoms cannot be created or destroyed. The atoms of the element are the same in all respects, but differ from the atoms of other elements. The elements' atoms are combined in small amounts to form molecules. The atoms of one element are combined with the atoms of another element in a simple relation to the form of molecules of compounds. Atoms are the smallest units of matter that can take part in a chemical reaction. 3. What is an alpha particle? Solution: The double charged helium-ion (He2), containing two protons and two neutrons, is called a particle. In (alpha) a particle is formed two electrons made of helium atom. 4. What are cathode rays? How do these rays form? Solution: Rays that come from a negative plate (Cathod) and moves to the anode are called cathode rays. The formation of cathode rays With a high voltage charge from the induction coil is applied to tubes filled with gases at very low pressure (0.01 mm mercury column), gases become good conductors of electricity and begin to flow in the form of rays, which are cathode rays. 5. What is the nature of the charge on (i) cathode rays (ii) anode rays Solution: Cathode rays are negatively charged because they are made of negatively charged particles. Anode rays are positively charged because they are made of positively charged particles. 6. How are X-rays produced? Solution: X-rays are produced when a cathode beam is produced to fall on hard metal targets like tungsten. 7. Why -were.anode rays also called channel rays? Solution: In an experiment with a discharge tube, a set of rays was found to go in the opposite direction of the cathode. They were called canal rays because they passed through holes or canals in the cathode. 8. How does cathode rays differ from anode rays? Solution: Cathode rays of anode rays They travel from the cathode to the anode. They travel from an anode to a cathode. They are made of negatively charged particles. They are made of positively charged particles. They produce greenish-yellow fluorescence on the soda glass screen. They produce fluorescence on the screen of zinc sulfide. They move towards a positive field and deviate towards the negative field. They deviate from electric and magnetic fields towards positive fields. 9. One observation that shows that the atom is not indivisible. Solution: Chadwick discovered neutral particles present in the atom by bombarding light nuclei such as beryllium and alpha particles. This observation shows that the atom is divided. 10. (a) Name an item that does not contain a neutron. b) If the atom contains one electron and one proton, will it carry any charge or not? Solution: (a) Hydrogen does not contain a neutron. b) If the atom contains one electron and one proton, it will be neutral. 11. Based on the Thomson atom model, explain how neutral the atom is overall. Solution: According to Thomson's atomic model, the atom consists of positively charged substances in the form of a sphere. Electrons are embedded in this sphere, and the total positive charge of the sphere is equal to the full negative charge of electrons, which means that the atom remained electrically neutral. 12. Which subatomic particle was detected (a) by Thomson (b) Goldstein (c) Chadwick. Solution: a. Thomson discovered electrons. B. Goldstein discovered the protons. C. Chadwick discovered neutrons. 13, Name the subatomic particle, the charge of which a) No.1 (b) -1 (c) 0. Solution: b. Electron c. Neutron 14. (a) Which metal chose Rutherford for his particle scattering experiment and why? (b) What do you think would be the observation of a particle scattering experiment that is conducted on (i) a heavy nucleus, like platinum (ii) light nuclei such as lithium. Solution: a) Rutherford used gold for his scattering experiment because gold is the most malleable metal and he wanted as thin a layer as possible. b) (b) If a metal with a heavy core is used to observe particle scattering, it will be the same as in the original experiment. (ii) If a light metal like lithium is used to scatter the particles of the experiment, then the massive alpha particles will push the nucleus and cannot be deflected back. 15. Based on the Rutherford atom model, whose subatomic particle is present in the nucleus of the atom? Solution: Based on Rutherford's model, the atom, whose subatomic particle is present in the nucleus, is a proton. 16. What part of the atom was discovered by Rutherford? Solution: Rutherford opened the core. 17. How has it been shown that an atom has an empty space? Solution: Rutherford conducted an experiment allowing a stream of alpha particles to pass through a very thin gold foil. He noticed that alpha particles pass through metal foil without deviating from their path. This shows that the atom contains a large empty space called nuclear space. 18. It is one of the main drawbacks of the Rutherford model. Solution: Comparing electrons with the planets of the solar system is the main drawback of the Rutherford model. Thus Rutherford's model could not explain the stability of the atom. 19. In the picture given side by side: (a) The name of the shells designated A, B and C. Which shell has the least energy consumption? (b) Name X and wither the charge on it. c) the aforementioned sketch of the atom model. Solution: a) A for the K shell or I shell. B for the L or II shell. C for the M or III shell. Shell K has a minimum amount of energy. b) X is the core, it is positively charged. (c) The aforementioned figure is a model of the Bora atom 20. Give the postulates of the atomic model of Bora. Solution: The postulates of the Bora atomic model are: electrons orbiting the nucleus are limited to certain fixed orbits called shells or energy levels, each of which is associated with a fixed amount of energy. (ii) The electron does not lose or receive an electron when moving around the nucleus. Electron, rotating in a certain orbit, gaining a certain amount of energy, jumps into the next orbit and vice verse. Exercise:4 B 1. (a) Name three fundamental particles of the atom. (b) Give a symbol and charge each particle. 2, Complete the table below, identifying P, q, R and S. Solution: (a) Electrons, protons and neutrons are the three fundamental particles of an atom. b) Particle symbol Electron e -1 Proton P No.1 Neutron n No Charge 2. Fill in the table below that identifies the P symbol q and R Element No of Protons No from Neutrons No Sodium Electrons ({23}-{11}-textrm)) 11 P 11 {17} {35} Chlor 17 Uranus R 92 146 92 S ({19}-{9}-textrm)Na) 9 10 9 Solution: P- 12 q-17 R-' ({238}'{92}-textrm-U) 3. The atom of the element consists of 4 protons, 5 neutrons and 4 electrons. What is its atomic number and mass number? Solution: Atomic number - Number of protons or number of electrons - 4 Mass number - Number of protons - Number of neutrons - 4 and 5 and 9 4. Atomic number and mass sodium count 11 and 23 respectively. What information does this statement convey? Solution: Atomic number (11) of sodium transmits information that the number of protons and electrons is the same. The mass amount (23) of sodium indicates the number of protons and neutrons. 5. Write down the names of the particles represented by the following characters and explain the value of the attached superscript and subscription numbers. Solution: p - proton n - neutron e - electronic top superscript number: These superscripted numbers show their mass number Lower Subscriptive number: These numbers show their atomic number 6. From the symbol ({24}{12}-textrm-Mg) mass level, atomic number and electronic magnesium configuration. Solution: Mass number 24 Atomic number 12 No. electrons Nos. 24 - 12 and 12 Electronic configuration Nos. 2, 8, 2 7. The sulfur has the atomic number 15 and the mass number 32. The level of protons and neutrons in the nucleus of sulfur. Give a simple diagram to show the location of the electrons in the sulfur atom. Solution: Atomic Number 16 Atomic Mass - 32 Number of Protons - 16 Number of Electrons - 16 Number of Neutrons - 32 - 16 - 16 Electronic Configuration No. 2, 8, 6 8. Explain the rule that electrons are filled with different levels of energy. Solution: (i) The maximum shell capacity for electron placement is given by the general formula 2n2, where n is the serial shell number. (ii) The maximum number of electrons possible in the outer shell is 8, and in the penultimate shell - 18. There is no need for the orbit to be completed before another one is formed. In fact, a new orbit is formed when the outer shell reaches 8 electrons. 9. Draw an orbital diagram of Ca'2 ion and a bit more of the three fundamental particles present in it Solution: Number of three fundamental particles Ca2: Protons: 18 Electrons: 18 Neutrons: 40 - 18 and 22 10. Write down the electronic configuration as follows: a) a) {27} ({13}-textrm-X) {17} {35} (b) Solution: Electronic configuration: 2, 8, 3 Number of electrons 13Numer of neutrons 27-13 14 Electronic configuration: 2, 8, electrons - 17Numer of neutrons 35-17 18 Exercise:4 C 1. How does modern atomic theory contradict Dalton's atomic theory and correlate with it? Solution: Recent studies of the atom have shown that most of Dalton's atomic theory is contradictory. However, Dalton was right that atoms take part in chemical reactions. Comparison of Dalton's atomic theory with modern atomic theory. Dalton's atomic theory: Atoms are indivisable. Atoms of the same element are similar in all respects. Atoms are combined into a simple ratio of a whole number to molecules. Atoms of different elements are different. Atoms cannot be created or destroyed. Modern atomic theory: Atoms are divided and composed of electrons, protons, neutrons and even more subparticles. Atoms of the same element may differ from each other. Atoms of different elements can be similar to isobare. Atoms are combined in a ratio that is not a simple ratio of numbers; for example, in sugar, the C12H22O1 ratio is not the ratio of the total number. 2. (a) What are inert elements? b) Why do they exist as monoatoms in molecules? What is electron valence? Solution: (a) Elements whose outer orbit is fully filled are known as inert elements. b) Inert elements exist as monoatomas, because the molecules of these elements contain only one atom. c) An electron present in the outermost orbital wasp known as valence electrons. 3. What is the difference between the three isotopes of hydrogen? Give them back to their structures. Solution: Three hydrogen isotopes differ in mass numbers, which are 1.2 and 3 respectively known as protiy, deuterium and tritium. 4. Match of atomic numbers 4. 14. 8. 15. and 19 with each of the following: (a) Solid non-metal valence 3. (b) Gas Valor 2. c) Metal Valor 1. (d) Non-metal valence 4. Solution: Name with valent atomic number (a) solid nonmetal valence 3. 15 (b) Gas Valor 2. 8 (c) Metal Valor 1. 19 (d) Nonmetal Valence 4. 14 5. Draw diagrams representing the atomic structures of the next a) sodium atom (b) chloride ion (c) carbon atom (d) ion oxide. Solution: 6. What is the significance of the number of protons found in the atoms of different elements? Solution: The number of protons in the nucleus of an atom determines the type of element of an atom. 7. Elements X, Y and q have atomic numbers 6, 9 and 12 respectively. Which of them : a) forms anion (b) forms a cation (c) has four electrons in its valence shell? Solution: a) Y (2, 7) forms anion. b) W (2, 8, 2) forms a cation. c) X (2, 4) has four electrons in the valence shell. Element X has an electronic configuration of 2, 8, 18, 8, 1. Without X identification, predict the sign and charge on a simple X ion. Write if X will be an agent's oxidizer or reduce agent. Why? Solution: (a) X1 (b) an oxidizing agent because it can sacrifice electrons. 9. terms : (a) mass number (b) ion c) cation d) anion (e) element f) of orbit. Solution: (a) A mass number is the sum of protons and neutrons present in the nucleus of an atom. b) Ion is an atom that is responsible for receiving or losing electrons (c) A positively charged ion, which is formed after the loss of an electron called a cation. d) A negatively charged ion formed after receiving an electron is called anion e) An element is a substance that cannot be divided into two or more simple substances by conventional chemical methods of applying heat, light or electric energy f) A circular path around the nucleus in which the electrons of the atom rotate. 10. From the symbol ({4}-{2}-textrm) for the helium element, write down the mass number and atomic number of the Solution element: Atomic number No. 2 Mass number 4 11. Five atoms are labeled from A to E. Mass Atoms without atomic No. A 40 20 B 19 9 C 7 3 D 16 8 E 14 7 (a) Which of these atoms : (i) contains 7 protons (ii) has an electronic configuration of 2 7. (b) Write down the formula of the connection: between C and D. (c) Predict: (i) metals (ii) non-metals. Solution: a. Atom E contains 7 protons. Atom B has an electronic configuration of 2, 7. b. Atom C means 7Li3, Atom D means 8O16. Thus, the composite formula Li2O. c. Metals: A and C, Non-metals: B, D, E 12. The atom of the element has two electrons in M it What is (a) atomic number (b) the number of protons in this element? Solution: The number of electrons in the shell is M No. 2, hence the number of electrons in the K and L shells will be 2, 8 thus the atomic number Nos. 2 and 8 2 and 12 Number of protons 12 13. -({24}-{12}-textrm-Mg) and ({26}-{12}-textrm)) are symbols of two magnesium isotopes (a) Compare the atoms of these isotopes in relation to : i) the composition of their nuclei. Their electronic configurations. (b) To cite the reasons why two magnesium isotopes have different masses. Solution: (a) {24} ({12} text) {12} {26}) electrons 12 12 No. Protons 12 12 No. neutrons 24 - 12 and 12 26-12 and 14 Hence, the composition of nuclei 12Mg24 ii). Electronic configuration 2, 8, 2 b) The massive number of magnesium isotopes differs due to the different number of neutrons, i.e. 12 and 14 respectively. 14. What are the kernels? How many nuclei are contained in phosphorus? Draw its structure. Solution: The components of the nucleus are called nuclei, i.e. protons and neutrons. Atomic mass of phosphorus No. 31 Atomic number 15 15. What are isotopes? With reference to which fundamental particles make isotopes different? Give two uses of isotopes. Solution: Isotopes are elements that have the same atomic number, but different mass numbers. Isotopes vary in respect of neutrons. Using isotopes Some isotopes are radioactive and they are used to treat cancer Ex: cobalt isotopes isotope 235U is used as fuel in a nuclear reactor. 16. Why do the {35}{17}-textrm-Cl) and q ({37}-{17}-textrm) have the same chemical properties? What is the difference between these atoms? Solution: Electrons are particles that occur in reaction. Chemical properties depend on the electronic configuration. In isotopes ({35} {17}-textrm) and ({37}-{17}-textrm) atomic numbers are the same; hence, their electronic configuration remains the same as their chemical properties. They differ only in physical content and weights, as neutrons contribute to the mass of the atom, which in this case is 35 and 37. 17. Explain the fractional atomic mass. What is the fractional mass of chlorine? Solution: Fractional atomic mass is a weighted average of all natural isotopes of this element. The fractional mass of chlorine is 35.5. 18. (a) What does the atomic number of the element mean by the atomic number? b) Complete the table below: No protons No electrons No neutrons Atomic number Mass Write down the electronic configuration (ii) Chlorine Atom ii) Chloride ion solution: The number of protons in the nucleus of an atom is the atomic number of the element. b) No protons No electrons No neutrons Atomic number Mass 17 17 18 17 35 17 17 20 17 37 c) i. Electronic chlorine configuration No. 2, 8, 7 ii. Electronic configuration of chlorine ions No. 2, 8, 8 19. Name the following: (a) an element that does not contain a neutron in its core. (b) An element that has a valence of zero. (c) Metal with valence (d) Two atoms have the same number of protons and electrons, but different amounts of neutrons. (e) The shell closest to the nucleus of the atom. Solution: (a) Hydrogen b) Helium c) Magnesium d) Hydrogen and Carbon e) K 20. Give the causes a) The physical properties of isotopes are different (b) Argon does not react. (c) The actual atomic mass exceeds the mass. (d) ({35}-{17} text)) and ({37}-{17}-text)) and are not distinguished by their chemical reactions. Solution: (a) Physical properties depend on the atomic mass of the element. Isotopes have different atomic mass, therefore, they differ in their physical properties. b) Arong outer orbit cimpletly filled with 8 electrons. That's why he doesn't react. c) The actual atomic mass is larger than the mass number, because the mass number is the whole number of the approximation of the atomic mass unit. d) ({35}-{17}-textrm)) and ({37}-{17}-text)) and do not differ in their chemical reactions by their atomic mass, determines chemical reactivity. Here chlorine istosis has the same mass amount. 21. Element Atomic Number 7 weighing 14 B electronic configuration 2, 8, 8 C electrons 13, neutrons 14 D Protons 18 neutrons Electronic configuration 2, 8, 8, 1 State (i) the valence of each element (ii) which is metal (iii) is a non-metal (iv) that is an inert gas. Solution: (i) Element Atomic Number No. 7 5 Valor A No 8 - 5 - 3 Element B Electronic Configuration 2, 8, 8 Valentia B - zero element C has 13 electrons Electronic configuration No. 2, 8, 3 Valentia C and 3 Element D Protons No. 18 - Electrons No. 2, 8, 8 Valentia D - zero element E Electronic configuration No 2, 8, 8, 1 Valencia E No 1 (ii) C and E are metals. (iii) A is non-metal. (iv) A, C and E are not inert gases. 22. Choose the right option (a) Rutherford Alpha Particle Scattering Experiment discovered by A. Electron B. Proton C. Atomic Nucleus D. Neutron (b) Number of valence electrons in 0-2 is : A. 6 B. 8 C. 10 D. 4 (c) Which of the following is the correct electronic potassium configuration? A. 2, 8, 9 B. 8, 2, 9 C. 2, 8, 8, 1 D. 1, 2, 8, 8 (d) Mass number of atoms with 10 electrons and 12 neutrons: A. 23 B. 22 C. 20 D. 21 23. Solution: a) C.Atomic Core b) A.6 c) C. 2, 8, 8, 1' d) D. A.23 23. Explain: (a) the octet rule for the formation of a chemical compound. (b) The rule of the bludgef for the formation of hydrogen. Solution: (a) Atoms of all noble gases have eight electrons in their outer shell. This composition is called the Octet configuration. Each element usually combines to reach electronic connections either by receiving or donating and exchanging electrons present in their outer shell. This rule of reaching an octet configuration is called the Octet rule. b) The hydrogen atom has one electron in the valence shell, which it shares with another hydrogen atom, having one electron to complete its duplet state, i.e. two electrons in the valence shell and resulting from the formation of hydrogen. Complete the following table on the atomic structure of some elements. Element Symbol Atomic Number Mass Number of Neutrons Number of Electrons Number of Protons Number of Protons Number of Protons Number of Protons Number of Protons Li 3 6 4 3 3 Cl 1 1 7 37 20 17 17 Na 11 23 12 11 11 Al 13 27 14 13 13 S 16 32 16 16 Exercise 4 D 1 How atoms achieve noble gas configuration? Solution: Atoms achieve a noble gas configuration either by receiving or donating and exchanging electrons present in their outer shell. Identify electrovalent communication. Solution: The chemical link formed by the electrostatic force of attraction between cation and anion is called electrovalent communication. 3. The elements are classified as metals, non-metallic, metaloids and inert gases. Which ones form an electrovalent connection? Solution: Metals tend to lose the electron; therefore, they are combined with non-metal to form an electrovalent connection. 4. (a) Atom X has three electrons larger than the noble Gas. What type of ion will it form? (b) Write the formula of his (X) i) sulfate (ii) (ii) (iii) phosphate (iv) carbonate (v) hydroxide. Solution: (a) The X atom, which has three electrons larger than the noble gas configuration loses 3 electrons to form the cation. b) i. X(SO4)3 ii. X (NO3)3 iii. XPO4 iv. X2(CO3)3 v. X(OH)3 5. Mention the basic tendency of the atom, making it in combination with other atoms. Solution: Atoms tend to

become stable, and for them stability is nothing more than obtaining an electronic configuration of inert gas. Helium has two atoms in its outer orbits, while other inert gases such as neon, argon, krypton, xenon and radon have eight electrons (octet) in the outer shell. 6. What compounds are usually formed between metals and nef metals and why? Solution: Metals and non-metals usually combine to form an electrovalent bond, because metal elements that have 1, 2 or 3 valent electrons tend to lose electrons and non-metallic elements that have 5, 6 or 7 valence electrons, usually get an electron. 7. (a) When XY2 is formed, the X atom gives one electron to each Y atom. (b) Draw the orbital structure of this compound (XY2). (a) The nature of communication in XY2 is an ion link. b) The orbital structure of the XY2 Solution: 8. Atom X has an electronic configuration of 2.8.7. It is combined with Y having 1 electron in its outer shell. (a) What type of connection will be formed between X and Y? (b) Write the formula of the formed connection. Solution: a) Ionic Link b) XY 9. Draw a diagram of the orbit structure of sodium chloride (NaCl) b) Calcium oxide (CaO) Atomic Numbers Na 11, Ca-20, Cl' 17, O'8' Solution: (a) b) 10. Compare: (a) sodium atom and sodium ion (b) chlorine atom and ion chloride, in relation to (i) atomic structure, (ii) electric state Solution: sodium atom ion sodium atom is electrically neutral. Sodium-ion is positively charged. There are 11 protons and 11 electrons in the sodium atom, i.e. an equal number of protons and electrons. There are 11 protons in the sodium ion, but 10 electrons, i.e. sodium ion contains fewer electrons. The sodium atom has only one electron in its valence shell. Sodium ion has 8 electrons in the valence shell. The size of a sodium atom is larger than sodium ion. The size of sodium ion is less than the sodium atom. Chlorine atom chloride ion In chlorine atom, there are 17 protons and 17 electrons B chloride ion, there are 17 protons and 18 electrons chlorine atom and the neutral chloride atom negatively charged chlorine atom is reactive. Ion chloride non-reactive chlorine is toxic, poisonous and used for bleaching and disinfectant. Chloride is not toxic and is easily digested by plants 11. The electronic configuration of fluoride ion is the same as that of a neon atom. What is the difference between them? Solution: Fluoride ion is a negatively charged ion with 9 protons 10 electrons, while neon atom atom neutral with 10 protons and 10 electrons. 12. (a) What do you understand from the reaction of redox? Explain oxidation and decrease in the loss or amplification of electrons. Solution: (a) When a redox reaction, there is an electron transmission that leads to the formation of bonds. The electropositive atom is oxidized, while the electroneguation atom is reduced. b) Oxidation is the process by which an atom or ion loses electrons. Reduction is the process in which an atom or ion acquires electrons. 13. Potassium (at No. 19) and chlorine (in No. 17) form a compound. Explain the formation of a compound based on a) oxidation (b) reduction (c) of the oxidative agent (d) reducing the agent. Solution: 2K and Cl2 q 2KCl (a) Oxidation: In an electronic concept, oxidation is the process by which an atom or ion loses an electron (s). CK and e-b) Reduction: In the electronic concept, contraction is a process in which an atom or ion takes an electron (s). Cl2 and 2e-' 2Cl- c) The oxidative agent oxidizing other substances either by taking electrons, either by providing oxygen or an electronethive ion, or by removing hydrogen or electropositive ion. Cl2 and 2e-'2Cl- d) Reducing agent reduction reduces other substances either by providing electrons or by providing hydrogen or electro-positive ion, or by removing oxygen or an electronethive ion. CK - E- Exercise :4 E Page No: 76-77 1. (a) Identify covalent (molecular bonds). b) Give the example of a covalence bond formed (i) by similar atoms (b) by dissimilar atoms Solution: (a) The connection formed between two atoms by mutual exchange of one or more pairs of os electrons, called covalent communication. b) (b) (c) The bond between the two Cl atoms; Cl'u2012Cl ii) The link between the hydrogen atom and the chlorine atom; H'u2012Cl 2. Covalent bonds can be a single, double or triple covalent bond. How many electrons are separated in each? Here's an example of each type. Solution: One covalent bond is formed by sharing a single pair of electrons between atoms; each atom contributes one electron. In the photo: Formation of hydrogen molecules Double bond is formed by the sharing of two pairs of electrons between two atoms. In the photo: Formation of the oxygen molecule Triple bond is formed by sharing three pairs of electrons between two atoms. Ex: Formation of N2 3 molecules. Show the number of bonds in (i) the molecule ethane (ii) molecule Etin Solution: i) The ethane molecule has one double covalent bond and four single-valent bonds. (ii) The ethane molecule has one triple covalent bond and two single-valent bonds. Element A has 1 electron in its first shell. It is combined with Clement B having 7 electrons in his third shell. What type of bond Solution: Element A with 1 electron in the first shell is hydrogen, and element B with 7 electrons in the third shell is chlorine. Thus, one covalent bond is formed between the and chlorine, sharing one pair of electrons. 5. Compare atomic numbers 4, 8, 10, 15 and 19 with each of the following (a) elements that can form a trivalent ion. (b) An element with four shells. (c) An element with 6 valence electrons. (d) An element that does not form the ion. Solution: Atomic Configuration No. 15 Electronic Configuration (15): 2.8.5 Atomic Configuration No. 19 Electronic Configuration (19): 2.8,8,1 Atomic Configuration No. 8 Electronic Configuration (8): 2.6 Atomic Configuration 10 Electronic Configuration (10): 2.8 6. If electrons are added to element Y; Then (a) is Y getting oxidized or decreased? (b) To what charge will Y migrate during electrolysis? Solution: (a) Electrons are added to element Y, so it decreases. b) Y will migrate to a positive charge. 7. (a) Elements X, Y and q have atomic numbers 6, 9 and 12 respectively. Which of them (i) forms anion, ii) forms a cation, b) state-type bond between Y and I and give, its molecular formula. Solution: i. Y No 9 ii. 12 Ionic connection with the molecular formula Y2. 8. Taking MgCl as an example of electrovalent communication, CCl4 as a covalent connection. Give the difference between electrovalent and covalent ties. Solution: MgCl2 - CCl4 Electrovalent Compound - Kovalent Compound They are solid crystalline solids consisting of ions. These are gases, fluids or soft solids. They have high melting and boiling points. They have low melting and boiling points. They conduct electricity in a fused or aqueous state. They do not conduct electricity in a solid, molten or aquiratous state. They are soluble in inorganic solvents, but insoluble in organic solvents. They are insoluble in water, but dissolve in organic solvents. 9. Potassium chloride is an electrovalent compound, while hydrogen chloride is a covalent compound. But, both conduct electricity in their aqueous decisions. Explain. Ans. : Both have free mobile ions in their aqueous state solution: In electrostatic attraction potassium chloride forces relax in a fused state or in aqueous solution that make them conduct electricity. Hydrogen chloride is a polar compound that is ionized in their solution, which acts as an electrolyte. This will make Hydorgen chloride to carry electricity. 10. Name two compounds that are covalent when used in pure use, but produce ions when dissolved in water. Ans. - Solution for Ammonia and HO: HCl and NH3 11. Element M burns with oxygen to form MO ion compounds. Write a formula of compounds formed if this element is made in conjunction with chlorine and sulfur separately. Solution: MCl2 MS 12. Give an orbital diagram of the following: (a) magnesium chloride, b) nitrogen, (c) methane (d) hydrogen chloride solution: c) 13. Learn the type of communication in the following molecules. (a) Water, (b) calcium oxide, c) hydrogen chloride solution: (a) Polar covalent bond b) Ionic link (c) Polar covalent bonding link Metal M forms chloride with the FORMULA MC12. What type of communication in MC12. Write the formula of the compound when M is combined with sulfur, oxygen and nitrogen. Solution: The link between metal and non-metal is an ion link. The link between metal M and chlorine is an ion bond. When metal M is combined with sulfur - MgS When metal M is combined with oxygen - MgO When metal M is combined with nitrogen - Mg3N2. 15. Explain the following: (a) The mass of the atom is concentrated inside the nucleus of the atom. (b) Atoms are combined by transmission and exchange of electrons (s). (c) The element has atoms with different mass, d) Carbon-12 and carbon-14 both show the chemical properties of the Solution: (a) The mass of the atom contributes to the proton and the neutron. The electron has a small mass, which does not make a big contribution to the mass of the atom. Because protons and neutrons lie inside the nucleus, the mass of the atom is mainly present in the nucleus. b) Atoms tend to reach a stable electronic configuration. To achieve a stable configuration, they separate the electrons present in their valence electrons. 16. Choose the correct answer from variants A, B, C and D: (i) The characteristics of the covalent compound is that: A. they are grown by sharing electrons. B. they are formed between metals and non-metals. C. they are formed between two non-metals. D. They often exist as liquid. (ii) When the metal atom becomes ion A. It loses electrons and oxidizes, B. It acquires electrons and decreases, C. It acquires electrons and oxidizes, D. It loses electrons and decreases Solution: (i) B. They are formed between metals and non-metals. (ii) A. It loses electrons and oxidizes. 17. Identify the following reactions as either oxidation or contraction: (i) O q 2e- O-2 ii) K-e-K e iii) Fe'3 - e-Fe-2 iv) y y y 2 2e- Solution: i) Reduction ii) Reduction iii) Oxidation 18. (a) Name the charged particles that attract each other to form electrovalent copopunds. (b) When electrovalent compounds are formed; electrons are transmitted from one element to another. How do electrons participate in the formation of a covalent compound? c) Electronic confi.wration of nitrogen (2, 5) How many electrons in the outer shell of a nitrogen atom do not participate in the formation of a nitrogen molecule? (d) In the formation of magnesium chloride (by direct combination of magnesium and chlorine). Name a substance that oxidizes and a substance that decreases. Solution: (a) Cation and anion b) by mutual exchange of electrons c) Two g) Magnesium oxidizes and chlorine decreases. What term is defined below? (a) A connection formed by a common pair of electrons, each of which makes one electron in pairs. (b) A link formed by the transmission of an electron (s). Solution: (a) Single-valent communication (b) Electrovalent communication 20. Next (a) element having a valence of zero. (b) Metal with valence alone. (c) Atoms of the same element, different in mass. (d) Elements with the same mass number but different atomic number. (e) Communication formed by electron transmission (s) f) Ion, formed by electron enlargement (s) Solution: (a) Helium (b) Lithium (c) Hydrogen (d) 4018Ar and 4020Ca (e) Ionic Communication (f) Anion 21. Element X has 2 electrons in its M shell, it forms a link to element Y, which has 7 electrons in the third orbit. (a) Write the formula of the formed connection. b) What the nearest inert gas electronic configuration will be Element X and Y to acquire in) Show on the orbital chart forming a connection between X and Y. Solution: a) Element X is Mg (12) and Element Y is Cl (17), hence the connection formed will be MgCl2. b) The nearest inert gas electronic configuration for Element X is 2.8, while for element Y it is 2.8.8. c) 22. When forming (i) Oxygen Molecule ii) Carbon tetra chloride molecule, thrust the following. The electronic configuration of the nearest inert gas has been achieved. How many electrons are transmitted/transferred during the formation of bonds? What bonds form these connections? Draw orbital diagrams? Solution: When forming (i) Oxygen Molecule (a) Neon (10) 2.8 b) Two pairs of electrons divide. c) Kovalent Bond (d) Orbital Chart: When forming ii) Carbon chloride molecule (a) Neon (10) 2.8 b) Four pairs of electrons are divided. c) Kovalent Link d) Orbital Chart: For BYJU'S provides ICSE Books, ICSE Sample Documents, Previous Year Issue Documents, Solved Documents, and Important ICSE Syllabus issue for all subjects and classes Download BYJU'S Learning App. Dalton atomic theory claims that atoms are indivisible particles that are the main building blocks of matter. He argues that the existence of different types of matter is due to different types of atoms. The double charged helium-ion (He2), containing two protons and two neutrons, is called a particle. Alpha particle is formed by removing two electrons from the helium atom. The rays, which come from a negative plate (Catod) and moves to the anode, are called cathode rays. X-rays are produced when a beam of cathode rays is made to fall on a rigid metal target like tungsten. In the experiment with a bit tube, a set of rays traveling in the opposite direction of the cathode was found. They were called canal rays because they passed through holes or canals in the cathode. Rutherford opened the core. Rutherford conducted an experiment, allowing a stream of alpha particles to pass through a very thin gold foil. He noticed that alpha particles pass through metal foil without deviating from their path. This shows that the atom contains a large empty space, nuclear space. Comparing electrons with planets in the solar system is a major drawback Model. Thus Rutherford's model could not explain the stability of the atom. 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