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In this way 2 + 8 = 10 electrons were hosted. The next 2 electrons go to the shell. Structure 2: 8: 2 Example 2: Oxygen structure 2: 6 Special Potassium and Calcium Case Atomic Elements Number of Potassium is 19 and its electronic configuration is KLMN 2: 8: 8: 1 The atomic number of football is 20 and its electronic configuration is KLMN 2: 8: 8: 2 This abnormal behavior can be explained as follows: It is found that the shells have secondary shells. Smaller shells are defined s, p, d and f. The maximum number of electrons that can enter these are 2, 5, 10 and 14 respectively. These secondary shells may overlap, resulting in energies which may differ from the one provided purely on the basis of n = 1, 2, 3 etc. Therefore, when the electrons begin to fill, they can go on a new outer shell even before the inner shell is filled capacity. Atomic number and mass number The nuclei of atoms consist of protons and neutrons. These two components of the nucleus are indicated as nuclei. Electrons occupy space outside the core. Since an atom is electrically neutral, the number of protons in the nucleus is exactly the same as the number of electrons. This number is the atomic number given by the Z symbol. The atomic number represents the number of protons in an atom. While atoms are electrically neutral, an atom contains more electrons as it has protons. The total number of protons and neutrons in an atom of an element is known as mass number. Mass number (A) = Number of protons (Z) + Number of neutrons (n) You can also say that: mass number (A) = atomic number (z) + number of neutrons (n) symbols the mass number (a) is written as a supersscripton the top left of the atom symbol. The atomic number (Z) is written as a pedice in the lower left corner. Example: The symbol represents a sodium atom whose atomic mass is 23 and the atomic number is 11. Calculate the number of protons, electrons and neutrons. Atomic number z = 11 atomic mass= 23 Number of protons = z = 11 Number of electrons = 11 Number of neutrons = A - Z 23 - 11 = 12 Isotopes It is interesting to note that the atoms of a given atomic number can have different neutrons. The atoms of elements that have the same atomic number with different mass numbers are called isotopes Some examples are listed below: Hydrogen isotopes Hydrogen atom (z = 1) has no neutrons. Number of protons = 1 number of electrons = 1 number of neutrons = 0 It has been reported that the hydrogen element has atoms with mass number 2 and 3 also IE Isotopes of nuclear composition chlorine isotopes: isotopes of carbon isotope carbon nuclear composition: table of some elements that exist as mixtures of isotopes relative atomic mass (RAM) of isotopes Its atomic mass (AR) is the average mass of an element, taking into account its natural isotopes and their percentage abundance. The rigid definition of the relative atomic mass is that AR = average mass of all isotopic atoms present in the element compared to 1/12 of the mass of a carbon-12 atom. Example: Chlorine consists of 75% chlorine-35 and 25% chlorine-37. Therefore the relative atomic mass of chlorine is 35.5 or AR (CL) = 35.5 formation of ions from loss or gain of electrons, a neutral atom has changed into an ion. The ions are loaded atoms or a group of atoms. In other words, ions are particles formed by atoms by donation or acceptance of electrons. Below are some elements that reach the optical configuration of noble gases. Let's see how this happens. Study the date table: The elements can be grouped as follows: na, mg, k, ca g lose electrons s, o, f, cl g electronic gain Most of these atoms try to reach the configurations of Neon (2,8) or Argon (2,8,8). The charge on the cation indicates the number of donated electrons. In an anion shows the number of acquired electrons. Differences between atoms and ions The physical and chemical properties of an atom and ion of an element are very different, as studies have shown. Let us consider the example of a sodium atom and sodium ion. Differences between Sodium Atom and Sodium Ionization Energy and Electronic Affinity 1. Ionization The potential of ionization of energy (or ionization energy) is the amount of energy needed to remove one or more electrons from the outer shell of an atom isolated in the gas state. Atom (G) + IE The positive ions (G) + Electrons (G) Therefore, ionization energy gives the ease with which the electron can be removed from an atom. The smaller the value of ionization energy, the easier it is to remove the electron from the atom. An electron is held in an atom by the electrostatic force of the protons charged positively in the nucleus and negative charge of the electrons. By providing enough energy, you can remove an electron from an atom. The element is first brought into the state of steam. Then the electron is removed by providing energy equivalent to the ionization potential. Factors affecting ionization energy a) inert gases have a very high ionization energy, due to the stability of the outer shell. Helium has the highest ionization energy. b) Within a group, ionization energy generally decreases with the increasing atomic number. The increase in the atomic number results in the increasing atomic radio. Therefore, the outer shell electrons are farther than those of the previous element and can be removed easily. c) Ionization energy decreases to the group due to increased number of shells. The effective nuclear charge decreases to the growth of the atomic dimension. So it is easier to extract an electron from the outer shell of the atom. Electron Affinity This is the variation ofwhen 1 harassment gaseous atoms gains 1 halve of electrons in standard conditions. Cl (g) + e- Cl- (g) Group 7 elements have high electronic affinities, form negative ions easily, as the electronic affinity group decreases so reactivity decreases. The second electronis the energy necessary to add an electron to 1 halves of gaseous ions 1 to form 1 halves of 2 gaseous ions in standard conditions (where the standard conditions are 100kpa and 298k.) cl- (g) + e- Cl2-(g) this process involves the addition of an electron charged negatively to a negative ion - of course this process is endothermic since the energy must be supplied characteristics of isotopes all isotopes of an element have the same number of valence electrons so they have the same chemical properties. The physical properties of isotopes are different because of the difference in the number of neutrons in their nuclei. density, melting points and boiling points etc. are slightly different. Evaluation 1 1. the table shows the number of protons, neutrons and electrons in a chlorine atom. (i) completes the table to show the number of these particles in the chloride ion, Cl–, formed by this atom. (ii) what is the arrangement of electrons in a chlorine atom? 2. the bromine of the element exists as a mixture of two isotopes. (i) complete the table to show the number of protons and neutrons in nuclei (ii) the relative atomic mass of bromine is 80. deduce the percentage abundance of the two isotopes in bromine. 3. the following table shows some information about chlorine isotopes. (a) use information from the periodic table to help you complete the table. (b) (i) shows why the relative atomic mass of chlorine is given as 35.5. (ii) what is the relative molecular mass of a chlorine molecule? (c) draw a transverse point and diagram for a chlorine molecule, showing only external electrons. 4. Atoms are made of electrons, neutrons and protons. (a) completes the table to show the relative mass and charge of an electron, neutron and proton. (b) the diagram shows the electronic structure of an atom of an element. (i) appoints the element of which this is an atom. explain your answer. (ii) what is the atomic number of this element? 5. the electronic structures (configuration) of elements represented by the letters p, q, r and s are: p 2.8.1 q 2.8.7 r 2.8.2. s 2.8.8 which element a) forms an anion b in single charge) forms a soluble carbonate c) reacts more vigorously with water 6. the following table shows the elements in the same group of the periodic table and their average atomic radiation, measured in the usual atomic measurements. symbols do not represent the actual symbols of the elements. atomic ray element (a) if the elements are in group 1, what element would probably be potassium? b) using the given letters, what element does the highest ionization energy have? given a reason for your answer 1.3 the periodic table dmitri mendeleev is credited as the father of the modern periodic table. in 1869 he organized the 50 or so known elements in atomic number order, z, putting elements with similar properties in the same vertical group, and leaving blanks for unknown elements, yet to be discovered. when the elements were then discovered, they were found to have the properties provided by the mendeleev table. groups and periods the rows in the periodic table are called periods. While moving from left to right in a given period, the chemical properties of the elements change slowly. the elements in the same period have the same number of shells, but the number of electrons occupying the last shell increases from left to right i.e. from one to eight. columns in the periodic table are called groups. groups move from above to bottom. the number of goces increases a group. However, the number of electrons in the last gocio of each element is the same. elements in a certain group in the periodic table share many similar chemical and physical properties. thePeriodic came through attempts by people to group elements according to their chemical properties. The modern periodic table is very useful to give a summary of the atomic structure of all elements. Some of the groups haveand some have numbers. Group 1 is called alkali metals. group 2 is called the alkaline earth metals. transition metals are at the center. They have no group number. group 7 is called "the halogens." group 8 is called "the noble gases." 7.0.0 chemical families patterns and properties a group is a vertical column of chemically and physically similar elements. alkali metals are in group 1 on the left of the periodic table. the elements of this group are hydrogen (h,) lithium (li,) sodium (na,) potassium (k,) rubidium (rb,) cesium (cs) and francium (fr) all have only one electron in their outer shells. since the atomic number, then the number of shells increases the group, the atomic ray increases the group. because the atomic or ionic radius increases the group: from one element to another, an additional electron goiter is added. this increases the bulk of the electron and the external electrons are less and less strongly kept. the radii of the adjacent group 2 atom is smaller than the atom of group 1 on the same period, because the nuclear charge has increased from one unit (l to r), but it is attracting electrons in the same joint. Similarly, the radii of group 2 m2+ ion is smaller than the adjacent group 1 m+ ion on the same period, because the nuclear charge has increased from one unit (l to r), but it is attracting the same number of electrons in the same shells. alkali metals are all highly reactive, losing their external electron to form a 1+ ion with non-metals. they give 1 electron easily as losing 1 is easier than getting 7 to complete the octet. all have the common properties of metals, being silvery gray in color, and good conductors of heat and electricity. are unusually soft and can be easily cut with a knife. when they cut just, they quickly water from reaction with oxygen to form a layer of oxide, which is why they are stored under oil. the first three members, lithium, sodium and potassium, are unique in being the only less dense metals of water (they float.!) the energy of ionization (E.I.) decreases the group this is the energy necessary to remove a molecule of electrons from the outer shell of an atom to form a positively loaded ion. M(g) M+(g) + e- this process can be repeated again to give the second ionization energy. This is more difficult than the first ionization energy because we are removing a negative electron from a positive ion. M+(g) M2+(g) + e- and more. M2+(g) M3+(g) + e- you can continue this way until the electrons on an atom have been removed. As you descend the group from one element to another, the atomic ray becomes larger due to an extra electron goiter filled. The external electrons are increasingly far from the core and are also shielded by the goicon of extra electrons complete with negative charge. Therefore the external electrons are less and less strongly held by the positive nucleus and therefore it is necessary to reduce and less energy to remove them. Successful ionization energies always increase, for example. 3 ° > 2 ° > 1 °, because the same nuclear charge is attracting less electrons and on average closer to the nucleus. but note the 2nd ie for group 1, and the 3rd ie for group 2, show a particularly significant increase in the ie compared to the previous ionization energy or energies. this is due to the removal of an electron from a complete electronically highly stable internal gocio and puts a higher limit on the chemically stable oxidation state. because reactivity increases the group when an alkali metal atom reacts, loses an electron to form an ion loaded in a unique way, for example. na+ + e- (in terms of electrons 2.8.1 2.8 and thus forming a stable ion with an agreementa noble gas.) as the group descends from an element until the next atomic ray becomes larger due to an extra electron goiter filled. the external electron is increasingly far from the core and is also shielded by the gocio of extra electrons complete with negative charge. therefore thereforeelectron is less and less strongly held by the positive nucleus. this combination of factors means that the external electron is more easily lost, the m + ion is more easily formed, and therefore the element is more responsive while you go down the group. the subject of reactivity is mainly reduced to reduce more and more ionization energy along the group. summary of the tendency of alkali metals reactivity as you descend the group from one element up to the next atomic ray becomes larger due to an extra electron goiter. the external electron is further away and beyond the nucleus and is also protected by the extra negative charge gocio, so the external electron is less and less strongly held by the positive nucleus while the attractive force is diminished, and so. this combination of factors means that the external electron is more easily lost, the ion m + is formed more easily, and therefore the element is more responsive while you descend the group oi of alkaline metals na + salts 1. salt common from sea water or underground deposits is sodium chloride and is the raw material to make sodium, hydrogen, chloride and sodium chloride by electrolysis. 2. Sodium hydrogen carbonate (nahco3) used in sodium bicarbonate, pharmaceutical products such as indigestion tablets and extinguisers. 3. sodium hydroxide (naoh) used in the production of soaps, detergents, acid salts, paper and ceramics. alkaline earth metals - group 2 - properties. the second group (group ii a) has berillio (be,) magnesium (mg,) calcium (ca,) strontium (sr,) barium (ba) and radium (ra.) have two electrons in their last gocio and their valence is +2 since they give up two electrons to form compounds. the elements of the group are not as metallized as alkaline metals. They form oxides easily and are known as alkaline earth metals. group 2 alkaline earth metals earth alkaline are all reactive, losing their two external electrons to form an ion 2+ with non-metals. mg2 + + 2e- ca2 + + 2e- from the calcium that drops the group, must be kept under oil, or react with oxygen in the air. are less reactive than alkali metals (group 1.) calcium and magnesium are fourth and fifth in the reactivity series. have all the common properties of metals, being silvery-gray, and good conductors of heat and electricity. are less soft than alkaline metals, and it is difficult to cut them with a knife. the only two of the group that are studied at kcse are magnesium and calcium. strontium, barium and radio are too reactive or unstable to use. all you need to know about these three is that they have the same chemical properties as magnesium and calcium. berillio is odd and is not studied at kcse. He expected to lose his two external electrons like the rest of group 2, but beryllium is so small that he does not like to lose two electrons. its compounds have a covalent character! As we proceed to group iii and further, we will notice that the number of electrons of valence increases by one in each subsequent group. trend in first ionization energy down group 2 explanation of this trend the first energy of ionization is the change of entalpia when a mole of gaseous atoms constitutes a mole of gaseous ions with a single positive charge. It is an endothermic process, that is, it is positive. a general equation for this change of entalpia is: ionization energy is governed by: â€ ¢ charge on the core, â€ ¢ the amount of projection of the internal electrons, â€ ¢ the distance between the external electrons and the nucleus. descending group 2: how does the first change of ionization energy drop the group? External electrons are kept in their shells by the attractive force of positive protons in the nucleus, nuclear attraction. as more and more electrons goggles are added this force youDue to 1. The distance between external electrons and the core increases 2. Internal electrons shield nuclear electrons from external electrons, electronic electronic The lower the ionization energy the easier it is to remove the electrons from the outer shell of the atom. As you go down a group decreases ionization energy. This also explains why metals become more responsive while you go down a group. It becomes easier for them to renounce electrons to form bonds. As the number of protons in the nucleus increases Group 2, you may expect the first ionization energy to increase because it increases the nuclear charge. This does not happen, because the above factors have a greater influence on the value of the first ionization energy. Trend in atomic radius falling Group 2: There are more energy levels filled between the core and the external electrons, so the external electrons are more shielded by the nucleus attraction, so the electrons in the external energy levels are further from the nucleus and the atomic ray increases. As the number of protons in the nucleus increases Group 2, you may expect the atomic ray to decrease because it increases the nuclear charge. This does not happen, because even if the electrons in the inner energy levels approach the nucleus, the factors described above have a greater influence on the atomic radius overall. Reaction with air magnesium burns vigorously with a bright white flame if strongly heated in air/oxygen to form a white powder of magnesium oxide. Magnesium + Oxygen Oxide 2mg (s) + o2 (g) 2Mgo (s) Calcium Burns fast enough with a red brick flame If strongly heated in air / oxygen to form calcium oxide in white powder. Calcium calcium pot + oxygen 2CA (s) + O2 (G) 2CAO (s) Reaction (s) with water 1. Magnesium does not react with cold water. Magnesium powder also finely reacts only very slowly. Magnesium will react with gaseous water (vapore) to form magnesium oxide and hydrogen. Magnesium + vapour magnesium oxide + hydrogen. MG (s) + H2O (G) MGO (s) + H2 (G) Magnesium oxide is a base. It won't dissolve in water. In fact, magnesium is so reactive, it will also burn in carbon dioxide, white magnesium oxide powder products and elementary carbon black spots! Magné Sium + carbon dioxide ==> Magnesium oxide + carbon 2mg / i + CO2 (G) ==> 2Mgo (s) + c / i 2. Calcium (and metals below calcium in Group 2) will react cold water. They'd live while they react, unlike the metals of group 1 floating. Calcium + hydroxide of water calcium + hydrogen. Ca (s) + 2H2O (L) CA (OH) 2 (L) CA (OH) 2 (s) + H2 (G) Calcium hydroxide is called slavated lime and will dissolve a little in water to form a calcium water reaction with acids magnesium is very responsive with diluted hydrochloric acid Form the soluble salt chloride in color and hydrogen chloride. Hydrochloride + Hydrochloride acid == Magnesium Hydrochloride + Hydrogen mg + 2hcl (AQ) ==> MGCL2 (AQ) + H2 (G) Magnesium is very reactive with hydrochloric acid dilute that forms chloride of soluble calcium in chloride and hydrogen gas. Calcium + sulphuric acid ==> calcium sulphate + hydrogen Ca (s) + H2SO4 (AQ) ==> Caso4 (AQ) + H2 (G) They occur in nature only in compounds due to their high reactivity. They are less reactive than group 1 elements thanks to the greater IE. They react with the elements of group 7 sends MX2 general formula (M is the metal and X represents all members of group 7. M + X2 -> MX2 Example Mg + Br2 -> MgBr2 Synthesis of the Reactivity TrendAlkali Terra Metals All Group II have 2 valence electrons (2 electrons in the highest level of energy) atomic radius increases for Subsequent group 'electronic shells' (energy levels) are filled down group, first ionization energy (the energy needed to remove 1 electrons from the gas atom) decreases. decreases.the atomic ray increases and the electron is further away from the nucleus is less attracted by the nucleus (it is said that the electron is 'moved') Down the Group, the second ionization energy (the energy necessary to remove an electron from the gas positive ionization) decreases. As the "conchials" are filled later electrons (energy levels), the electron is further away from the positively charged core, and therefore less attracted by it, making the electron easier to remove. Down the Group, the third ionization decreases (the energy needed to remove an electron from the 2+ gaseous ionization). As the "conchials" are filled later electrons (energy levels), the electron is further away from the positively charged core, and therefore less attracted by it, making the electron easier to remove. The second ionization energy is higher than the first ionization for each element. This is because it is more difficult to remove the electron since there are more positive charges (protons) in the nucleus that there are no negative charges (electrons in 'shells'), so the attraction of the electron to the core is greater. The third ionization energy is substantially higher than the second ionization energy. When 2 electrons are removed from the gas atom, the remaining electrons are arranged as a noble gas, which is a very stable electron configuration. It is very difficult to remove an electron from this arrangement. In general, electronic negativity decreases the Group as successive energy levels (electron shells) are filled, the positive nucleus exerts less force on the electrons and therefore has less capacity to attract electrons. The melting point decreases the Group as the elements become less metallic in nature. Halogens - Group 7. The halogens are all in group 7 on the right of the periodic table. This group consists of elements such as Fluorine (F), Chlorine (Cl), Bromine (Br), Iodine (I), Astatin (At). Halogens are typical non-metal and form the 7th Group in the Periodic Table 'Halogens' means 'ex salted' and the most common compound is sodium chloride that is found from natural evaporation as huge deposits of 'rock salt' or even more abundant as 'sea salt' in seas and oceans. Physical properties • Typical non-metallic with relatively low melting points and boiling points. • Melting and boiling points constantly increase the group (so change in the ambient temperature by gas => liquid => solid), this is because intermolecular attractive forces increase with increasing dimensions of atom or molecule. • They are all non-metallic colored elements. • Alogen color becomes darker in the group. • They are all poor heat and electricity conductors - typical of non-metal. • When solids are fragile and friable, for example iodine. • The size of the atom becomes larger as more internal electron shells are filled down from one period to another. Chemical properties The atoms have all 7 external electrons, this similarity external electrons, as with any Group in the Periodic Table, makes them have very similar chemical properties such as Forming negative ions charged individually, such as Cl- chloride- because they are a short electron of a noble gas electron structure. They gain a negative electron (reduction) to be stable and this gives a surplus electrical charge of -1. These ions are called halogenous ions, two others meet are called bromide ions Br- and iodide I-. They form ionic compounds with metals such as sodium chloride Na+Cl-. They form covalent compounds with non-metallic and with themselves. The ligature in the molecule involves individual covalent bonds, for example, HCl or H-Cl hydrogen chloride. The elements exist all as X2 or X-X, diatomic molecules in which X represents the halogen atom. La La la la la la la la la la la la la la laDecrease the group. â € ¢ All toxic elements are. â € ¢ Astatina is very radioactive, therefore difficult to study but its properties can be predictable using the principles of the periodic table and the trends of the Halogen group! Halogen! 7 (Alogeni) These have their outer electron orbits with electrons one less than the one required for full filling. These elements are gaseous in nature and have -1 valence, borrow electrons to stabilize their electronic configuration. They're all covalently tied diatomic molecules. Diatomic means that each molecule contains two atoms. Formulas are F2, Cl2, Br2, I2, (see chlorine structure). All alogens will. 1) Earn an electron from a metal to form an ionic bond, or 2) share an electron with a non-metal to form a covalent bond Reactions with metals. Alogens will acquire an electron to form an ionic bond with metals. Halogens will react with 1) Group metals 1 • Alkali metals burn very esoterically and vigorously when they heat in chlorine to form colourless crystalline ionic salts such as NaCl or Na+Cl-. This is a very expensive way to make salt! Its much cheaper to produce it by evaporating sea water! eg sodium + chloride ==> 2Na(s) + Cl2(g) ==> 2NaCl(s) • Sodium chloride is soluble in water to give a neutral pH 7 solution, universal indicator is green. Salt is a typical ion compound that is a fragile solid with a high melting point. Similarly, potassium and bromine form potassium bromide KBr, or lithium and iodine form lithium iodide 1) iron transition metals + iron bromide (III) bromide. 2Fe(s) + 3Br2(l) 2FeBr3(s) iron + iron chloride (III) chloride. 2Fe(s) + 3Cl2(s) All metal compounds are ionic salts that form a giant structure. They are called metal halide because they are formed by a metal and a halogen. Test halogenuri ions. Halide's ions undergo a series of unique reactions that allow testing a solid or aqueous specimen unknown for the presence of chloride, bromide or iodide ions. Aqueous silver ions react with halide ions to produce individually colored precipitates. These precipitates have different solubility in ammonia solution and so further differentiation can be achieved, see the table below, Aqueous lead(II) ions react with halogen ions to produce a different set of alogenous salts, see the table below, Summary of the Trend reactivity bond of Halogens All metals of Group VII have 7 electrons of valence (7 electrons in the highest level of electrons). The reactivity of the elements of Group VII is linked to the ability of the element to attract the electrons, therefore the greater the electronic negativity, the greater the reactivity of the alogen. Thus, the chemical reactivity of the elements of Group VII decreases the Group, from the most reactive (Fluorina) to the less reactive (Iodine). Down the Group, the first ionization energy (the energy needed to remove 1 electron from the gas atom) decreases. Since the atomic ray increases and the electron is further away from the nucleus is less attracted by the nucleus (it is said that the electron is "moved") The melting point and the boiling point increase the Group as the elements become more metallic in nature There is a color gradation that descends along the group, the elements become darker in color as they become more metallic in nature. Similarly, there is a gradation in the physical appearance at STP, from gas to liquid to solid, as the elements become more metallic in nature. Uses of Halogens 1. The chlorine itself is used as bleach and in the manufacture of sodium chlorate, which can be used as bleach and herbiicide. 2. Water purification is also based on chlorine to kill bacteriaafter the impurity water passed through various stages of filtration. 3. 3.It is also used in the production of chlorofluorocarbons, commonly called CFC, used in the past as refrigerant gases and propellants for aerosol canes. Both of these uses have now been prohibited by international law, at least in the developed world. 4. The problem that these chemical products cause is that when they reach the high atmosphere the molecules disintegrate to release the chlorine atoms. These chlorine atoms then react with ozone molecules, O3, transforming them into oxygen molecules. A chlorine atom can destroy thousands of ozone molecules. The ozone traps the UV light from the sun, preventing that it hits the surface of the earth, and with a depletion of the uV light ozone passes through, which increases the occurrences of skin cancer in humans. 5. The fluoride is used as fluoride salts in toothpaste or added to domestic water supplies to strengthen teeth enamel, helping to minimize the decay of teeth. (eg potassium fluoride). 6. The bromine and iodine are both used in 'halogen' earphones. 7. iodine is used in hospitals in the mild antiseptic solution 'dye of iodine'. The Gas Noble - Group 0. In this group, we Helium (He), neon (ne), Argon (AR), Krypton (KR), Xenon (XE) and Radon (RN). The electronic configuration will show that these atoms all have an external shell complete with electrons and are not interested in reacting with other elements. These elements are therefore chemically non-interactive and inert. They are therefore gaseous in nature. They are noble gases or inert gases. They are all colorless monatomic gases. Monatomic means that they exist as single atoms. The forces between atoms are very weak (and therefore are gas). Lowering the group from Elio to Radon, the density increases. The fusion and boiling point increases because atoms become more heavy (larger) and require more energy to dissolve or boil. Summary of noble gases â € ¢ The "noble gases" are the last group in the periodic table that form the last elements at the end of a period. â € ¢ are all non-metallic elements and all are colorless gases at room temperature and pressure with low melting points and boiling points. They form 1% of the air, and most of this is argon. All noble gases, except Radon, are separated from fractional distillation of liquefied air. Helium can also be obtained from natural gas wells where it accumulated by radioactive decay (alpha particles become helium gas atoms when they get two electrons). â € ¢ are very inactive elements because the highest busy electron level is complete, which means they have a shell complete with external electrons! They do not have electronically "wrong" to share electrons to form a covalent bond or to lose or earn electrons to form an ion tie. In other words, they are electronically very stable. â € ¢ There are single atoms, ie they are monatomic he ne ar an et etc. (Not diameter molecules as with many other gases). â € ¢ Their inertia is an important feature of their practical uses. â € ¢ Giù the group with a growing atomic number: the fusion point and the boiling point constantly increases (see data) the density constantly increases more probability to react and form a mixture with very reactive elements such as the variation of atomic fluorine Radius Down the Group while we move down the group, atoms become bigger as other electrons shells are added. An entire shell that is a set of 8 electrons is added from one element to another. This means that the atomic number and the mass number both increases while we move down the group. We can observe here that all the elements of the group have the same valence electrons and show the same values. Metallic and electronegativeness going A particular group, the properties of the elements are improved. For example, the figure below shows the I A group, the alkali metal elements. Because the atomic radii increases in the Alkali metal elements, the last electron is farther from the attractive nuclear power forces. So it's relatively easy for the element to give his last electron. And then show more metallicity. To say it in terms of electro positive character of elements, we can say that the positive character of the electro increases while we go down group I. Now, if we see the behavior of the elements in group VII or the halogen elements, we see that the negative character of the electro reduces as it descends towards the group. This means that fluorine (F) is more reactive than chlorine (Cl). The reason for this is that the orbit in which the additional electron is captured is closer to the core in F than in Cl. So the extra electrons are attracted to the F atom more strongly than that in Cl. Reactivity Down the Group With regard to chemical reactivity, we can see that in group I reactivity increases as they descend into the group. On the other hand, in the other extreme, in Group VII A, the reactivity decreases as we go down the group. Also group VIII A mixture of noble gases is completely irriactive. Summary of the characteristics of the elements in a group • Atomic numbers are not consecutive. • The number of electrons of valence in the elements is equal in a group. • The elements of the same group have the same value. Atomic rays increase as they go from top to bottom in a group. • The metallic character increases as it goes from top to bottom in a group for metal groups. For non-metallic groups, non-metallic nature decreases as it goes from top to bottom • Chemical reactivity increases as it goes from top to bottom into a group for metal groups. For non-metallic groups, chemical reactivity decreases as it goes from top to bottom. Periods: Characteristics of periods The first period begins with hydrogen (H) and ends with helium (He). It has only two elements H (Z=1) and He (Z = 2). H has an electron in the first cage. He's got two electrons in the first row. As we have seen in the chapter on the structure of the atoms, the first shell can contain only 2 electrons. So the first period is complete. It must be remembered that the place of hydrogen is unique in the periodic table. It was placed above the alkali elements from Li in group 1A. This is because H has the value 1 like other alkali elements. But the hydrogen properties otherwise are very different from the other elements of group 1A alkali Li, Na, K, Cs, etc. Now we see the following periods: periods 2 and 3. The second period begins with Li (Z=3), where the first shell is filled and the next shell begins to fill. After Li the next element is the beryllium (Be, Z=4). Its first shell is complete and has 2 electrons in the second shell. The maximum number of electrons held in the second shell is 8. Thus the period has 8 elements, in which the second shell of each element is filled. The last element of the period is neon (Ne, Z=10). Neon is the first and second shell are completely filled. A similar situation occurs for the third period. Here the next shell after the second shell or the third shell is filled. The maximum number of electrons in the third shell is 8. Thus through the period, starting from the element sodium (Na, Z=11) the third shell has 1 electrons; and the period ends with argon (Ar, Z= 18) which has 2 electrons in the first, 8 electrons in the second shell and 8 electrons in the third shell. Trends in period 3 Now we see some of the chemical and physical properties in a given period. What we will learn from a period will be true for all other periods. Consider the third period. The following figure shows how the electronic configuration is changing while we go from left to right in the period. The number of valence electrons increases integrally. The change in value is according to the tendency to renounce or borrow electrons. So the elements in the same period have consecutive atomic numbers and different valences. If we see atomic raysThe period, we will notice that the size decreases through the IL Now let's consider the metallic character of the elements in the third period. The figure below shows the same. We have the appropriate metals in the first and seconds places: sodium (na) and magnesium (mg) are alkaline and alkaline-earth metals. They give up the electrons in the last shell very easily. They are glossy to color and lead electricity. After mg it is aluminum (AL). Al has 3 electrons in its external shell and behaves like a metal. The next element is silicon (Yes). It has 4 electrons in its outer shell. He then needed to borrow four electrons or give up all his four electrons to form a stable shell. You don't do any of these, instead alloy Tetrahedrally most of the time. So you don't behave like a metal nor as a non-metal. So it's called as metal. After yes, three elements are: phosphorus (p), sulfur (s) and chlorine (cl). All three are non-metallic. So while moving from left to right in the period, the metallicity decreases. Even the first chemical reactivity decreases and then increases. As discussed before, chemical reactivity depends on how easily the most external orbit dÃ off or takes electrons to make a stable orbit. The two extremes of the third period, namely na and cl, are very reactive. But na is very electro-positive in nature, where as CL is very electro-negative in nature. If we look at the nature of the oxides formed by the elements in the third period, we see that sodium oxide is based in nature. The next oxide, ie magnesium oxide is also fundamental in nature. At the other extreme, chlorine oxide, sulfur oxides and phosphorus oxides are acids in nature. The medium-elements as to, have their oxides behave in both acid and basic way, depending on the oxidation conditions. These oxides are called amphoric in nature. First energy ionization throughout the period 3 The first ionization energy generally increases through the period 3. However, needs a more detailed consideration of the group 2 trend because: â € ¢ The first ionization energy drops between magnesium and aluminum Before increasing again. â € ¢ The first ionization energy drops between phosphorus and sulfur before increasing again. Table of physical data Explanation of this trend The first ionization energy is the change of enthalpy when a wheel of gaseous atoms forms a wheel of gaseous ions with a single positive charge. It's an endothermic process, ie positive. A general equation for this change of theentalpia is: through the period 3: â € ¢ there are more protons in each nucleus so that the nuclear charge in each item increases ... â € ¢ therefore the strength of attraction between The core and external electron has increased, and ... â € ¢ there is a negligible increase in shielding because each subsequent electron enters the same energy level ... â € ¢ so much energy is Required to remove the external electron. Tendency within the atomic radius of the period 3 elements The atomic radius decreases by crossing the period 3. Table of physical data Explanation of this trend through the period 3: â € ¢ Increases the number of protons in the core ... â € ¢ Increase nuclear power ... â € ¢ there are more electrons, but the increase in shield is negligible because each additional electron enters the same level as the main energy ... â € ¢ then increases the strength of attraction between the core and electrons ... â € ¢ So the atomic radius decreases. Because the number of electrons in each atom increases through the period 3, it could be expected that the atomic radius increases. This does not happen, because the number of protons also increases and there is relatively little additional shielding from electrons in the same level of main energy. Trend of electric conductivity The electric conductivity increases through the period 3 from sodium to aluminum, then to the silicon. The remaining elements have a negligible conductivity. Physical Data Table Explanation of this trend For an element to conduct electricity, it itContain free electron moving. In general, metals are good electricity and non-metal conductors are bad electricity conductors. Sodium, magnesium and aluminum sodium, magnesium and aluminum are all metals. They have a metallic bond, in which positive metal ions are attracted to the delocalized electrons. Delocalized electrons are free to move and carry out. Going from sodium to aluminum: Ã ¢ â,¬ â ¢ The number of delocalized electrons increases ... Ã ¢ â,¬ â ¢ There are more electrons that can move and bring upload ... Ã ¢ â,¬ Ã ¢ So the electric conductivity increases. Silicon Silicon is a metalloid (an element with some of the owners of metals and some of the properties of non-metals). Silicon has a giant covalent gluing. It has a giant lattice structure similar to that of the diamond, in which every silicon atom is glued in a covalent way into four other silicon atoms in a tetrahedral arrangement. This extends into three dimensions to form a giant molecule or a macromolecule. Silicon is called a semiconductor because: Ã ¢ â,¬ â â ¢ The four external electrons in each atom are kept strongly in covalent bonds ... Ã ¢ â,¬ â â â â â â â â â â â â â â â â â â ¢ a few electrons have enough energy at room temperature to insert i Higher energy levels so there are few delocalized electrons and silicon is a resulting conductor ... but ... Ã ¢ â,¬ â ¢ at higher temperatures plus electrons are promoted at higher energy levels ... Ã ¢ â,¬ â ¢ So there are more delocalized electrons to move and carry out. Do not metal the remaining elements in the period 3 do not conduct electricity: Ã ¢ â,¬ â â ¢ in phosphorus, sulfur and chlorine, external electrons are not free to move and bring upload because they are strongly kept in covalent bonds ... Ã ¢ â,¬ â ¢ In Argon (which exists as individual atoms) external electrons are not free to move and carry out because they are strongly kept in a third stable energy level. Trends in the melting and boiling points The trends of the fusion points and boiling points that cross the period 3 are not simple and need more detailed consideration than group trends 2: Ã ¢ â,¬ Ã ¢ the points of Melting generally increase from silicon sodium, then decrease in Argon (with a sulfur bumpÃ ¢ â,¬ ¬ Å " Ã ¢ â,¬ â € ¢ Boiling points generally increase to go from sodium to aluminum, then decrease to argon (again with a sulfur). Physical data graph table of explanation of physical data of the explanation of trends blend down when a substance melts, some of the attractive forces holding particles together are broken or loose so that particles can move freely one of the one Other but they are still close. The strongest forces are, more energy is necessary to overcome them and greater the fusion temperature. Boiling when a substance bubbles, most of the remaining attractive forces are broken so that particles can move freely and distant. The attractive forces are stronger, more energy is needed to overcome them and the greater the boiling temperature. Sodium, magnesium and aluminum sodium, magnesium and aluminum are all metals. They have a metallic bond, in which positive metal ions are attracted to the delocalized electrons. Going from sodium to aluminum: Ã ¢ â,¬ â ¢ The charge on the metal ions increases from +1 to +3 (with magnesium to +2) ... Ã ¢ â,¬ â ¢ The number of delocalized electrons increases. .. Ã ¢ â,¬ â ¢ So the strength of the metallic bond increases and ... Ã ¢ â,¬ â ¢ The fusion points and boiling points increase. Silicon Silicon is a metalloid (an element with some of the owners of metals and some of the properties of non-metals). Silicon has a giant covalent gluing. It has a giant lattice structure similar to that of the diamond, in which every silicon atom is covalently in four other silicon atoms in a tetrahedral arrangement. This extends into three dimensions to form a giant molecule or a macromolecule. silicon has a very high melting point and boiling point because: â€ ¢ all silicon atoms are held together by strong covalent bonds ... â€ ¢ that needs a very large amount of energy to be broken. Break.Sulfur, chlorine and argon These are all not metals, and there are as small and simple molecules. Phosphorus, sulfur and chlorine exist as simple molecules, with strong covalent bonds among their atoms. The Argon exists as separate atoms (is monatomical). Their fusion and hot points are very low because when these four substances come together or merge, they are the van der Waal forces and the forces between the molecules that are broken. These obligations are very weak ties, so little energy is needed to overcome them. Sulfur has a higher fusion point and a boiling point compared to the other three because: Ã ¢ â,¬ â ¢ phosphorus exists as molecules p4 Ã ¢ â,¬ â â ¢ there is sulfur as molecules s8 Ã ¢ Â, ¬ â ¢ There is chlorine as molecules cl2 Ã ¢ â,¬ â â â ¢ argon there is single atoms ar Ã ¢ â,¬ â â ¢ the strength of the van der wait forces decreases as the size of the molecule decrease Ã ¢ â,¬ â,¬ Ã ¢ So the fusion points and boiling points decrease in order S8> P4> CL2> AR Summary of the features of the elements in a period: atomic numbers are consecutive. The number of valence electrons in the elements increases incrementally from left to right. The elements of the same period have various different values. The decrease in atomic radii passing from left to right over a period. The metallic character is reduced as it goes from left to right over a period. Chemical reactivity is higher than two extremes and is the lowest center. The extreme left reactivity is more electro-positive while the extreme right is more electro-negative. The oxides formed elements on the left are basic and elements on the right are acids in nature. The oxides of elements in the center are ampheteric. Evaluation 2 1. In 1829 Dobreiner suggested that some elements could be put into groups of three because they had similar chemical properties. (a) Use the information in this table to explain why these elements are inserted in the same group. (b) Use the periodic table provided and the above information to suggest the probable properties of fluorine. 2. (a) An element R has atoms with electronic disposal 2. 8. 18. 8. 1. (i) What is the atomic number of R? (ii) In which group of the periodic table was found? (iii) Find R in the periodic table. Give the name of a more reactive element in the same group as R. (iv) Although R is a very reactive element, it does not react with Krypton, the item immediately before it in the periodic table. Take a reason for this failure to react. 3. A small piece of sodium is dropped into a large water beaker. Reacts to form sodium hydroxide solution and a gas. (a) Describe three things you would see in this experiment. (b) Give the name of the gas formed by this reaction. (c) Sodium hydroxide solution has a 14 pH. Complete the phrase using a word from the box. The acid alkaline neutral sodium hydroxide solution is Ã ¢ â,¬ | | "| | Â» | Â ».......... Ã ¢ â,¬ | | | | Â» How would water temperature change during reaction? (C) The experiment was Repeated with a piece of potassium of the same size. Give two observations that would be different in this experiment. 4. Part of the periodic table is shown. The letters used are not the symbols of the elements. (a) Use the letters P, Q, R , S and t in your answers. Each letter can be used once, more than once, or at all. Give the letter of (i) a group element 7 (ii) a group 0 element (iii) a solid a Room temperature (iii) A solid at room temperature (iv) a metal (V) a gas at room temperature 7. (a) noble gases are used in advertising signs and bulbs. (i) indicates a noble gas used in one Of these ways. (ii) explain why it is chosen for this use. (b) the table gives the boiling points of noble gases. Describe how i Boiling noble gases vary with the atomic number. (c) neon has two isotopes. (i) In terms of particles in the atoms, he explains how the two isotopes differ. (ii) using data, calculate the relative atomic mass of neon. (iii) explain why the IL The gases are not unintible. 8.0.0. Ionic (electrovalive) structure and bonding of noble gases such as neon or argon have eight electrons in their external shells (or two in the case of helium). These noble gas structures are somehow considered a "desirable" thing for an atom. When other atoms react, they try to organize electrons so that their external shells are completely full or completely empty. Chemical reactions occur so that atoms reaching the configuration of the inert gas to lose the valence electrons as in the case of metals or to gain electrons as in the case of non-metals. Ionic sodium ligaments Sodium chloride (2,8,1) has 1 electron more than a stable noble gas structure (2.8). If he gave away that electron he would become more stable. Chlorine (2.8.7) has 1 shorter electron of a stable noble gas structure (2,8,8). If he could get an electron somewhere he would become more stable. If a sodium atom gives an electron to a chlorine atom, both become more stable. Sodium has lost an electron, so it has no more equal numbers of electrons and protons. Because it has another electronic proton, it has a charge of 1+. If the electrons are lost by an atom, the positive ions are formed. The positive ions are sometimes called cups because they move to the cathode during electrolysis. Chlorine has gained an electron, so now it has another proton electron. Therefore it has a charge of 1-. If electrons are acquired by an atom, negative ions are formed. At times a negative ion is called anion since the drift to the anode during electrolysis. The nature of the ionic bond Sodium ions and chloride ions are held together by strong electrostatic attractions between positive and negative accusations. You need a sodium atom to provide extra electron for a chlorine atom, so combine together 1: 1. The formula is therefore NACL. Anchor of magnesium oxide, noble gas structures are formed and magnesium oxide is held together by very strong attractions between ions. The ionic bond is stronger than in sodium chloride because you have 2+ ions that attract 2 ions. The higher the charge, the greater the attractive force. The Magnesium oxide formula is MGO. Summary Ã ¢ â,¬ â ¢ The electrons are transferred from one atom to another with consequent formation of positive and negative ions. Ã ¢ â,¬ â ¢ The electrostatic attractions between positive and negative ions hold the mixture together. Property of ionic compounds All ion tie compounds produce giant ionic structures. They consist of opposite ions arranged in an ionic lattice, ions are held together by strong ion ties. for instance. NACL is composed of ions and ions na +. These obligations are difficult to break, so the ionic substances have very high fusion points and hot. Everything exists as solids. They conduct electricity when molten, © because the ions are free to move, but does not conduct when solid. They conduct electricity in aqueous state © because the ions are free to move. Most Ioniche substances are soluble in water © because the polar water molecules can accommodate charged ions. covalent bonding - single bonds in addition to achieving noble gas structures by transferring electrons from one atom to another as in ionic bonding, it is also possible for the atoms reach these stable structures sharing electrons to give covalent bonds. Depending on the number of pairs of shared electrons between the atoms that participate in the bond, the covalent bonds are classified as follows: some simple covalent chlorine molecules, for example, two chlorine atoms could both achieve stable structures sharing their single electron split as in diagram. The fact that a chlorine has been with electrons marked as crosses and the other as points is simply to show from where all electrons come. There is no difference between them. It is said that the two chlorine atoms are united by a covalent bond. The reason why the twoAtoms attack together is that the shared pair of electrons is attracted to the core of both chlorine atoms. Hydrogen hydrogen atoms only need two electrons in their external level to reach the noble ELIO gas structure. Once again, the covalent bond holds together the two atoms because the pair of electrons is attracted by both nuclei. This is another single bond. Hydrogen chloride hydrogen has a helium structure and chlorine structure an argon structure. The water oxygen atom has six electrons in the outer shell, while each of the two hydrogen atoms have one each. After bonding, oxygen has 8 electrons while each hydrogen atom has two as shown by the molecule. Nitrogen gas every nitrogen atom has five electrons in the outer shell. Everyone needs 3 electrons to complete the outer shell. In the formation of the molecule, each nitrogen atom contributes to three electrons and a triple bond is formed oxygen gas every atom oxygen has six electrons in the outer shell. Each atom gives two electrons for sharing. After the double covalent bond is formed, each atom has 8 electrons around it as shown. Methane hydrogen characteristics of covalent compounds 1) Covalent compounds are made up of molecules and non-ions. The molecules have no electric charge on them. The molecules are held together by weak forces called van der Waal forces. 2) The covalent compounds are gas, volatile liquids or soft solids. As there are weak, the van der Waal forces between molecules, are not held rigidly. The state depends on the energy of the link. If the energy of the bond is very low, they remain as a gas, if volatile liquids are appreciable. If very high, they exist as soft solids. 3) Covalent compounds generally have fuses and hot points. As Van der Waal forces are weak, a very small amount of energy is needed to break the link between the molecules corresponding to the low fusion point melting point and boiling point. 4) The covalent compounds dissolve into organic solvents. Because they do not contain ions, solvation does not take place when the water is added to the mixture. So they don't dissolve into water. 5) Covalent compounds are bad electricity conductors. They do not contain ions in the molten state, nor the ions migrate on the application of an electrical potential. So there is no current conduction. 6) The covalent compounds are less dense than water. Very weak van der Waal forces hold together the molecules, so there are great molecular spaces. As a result less number of molecules per volume of the unit, which also means the mass per volume of the unit is lower. So they have a low density. Exceptions Diamond and Graphite, the carbon allotropes have a high melting point. The hydrogen chloride in the aqueous state conducts electricity. Glucose, sugar and urea are soluble in water. Even ammonia and hydrogen chloride are dissolved in water. covalent Structures giants The covalent structure of the giant diamond carbon has an electronic format of 2, 4. In Diamond, each carbon shares electrons with four other carbon atoms - forming four single bonds. In the diagram, some of carbon atoms only seem to form two bonds (or even a bond), but it is not exactly the case. We are showing only a small piece of the whole structure. This is a giant covalent structure - continues on and on in three dimensions. It is not a molecule, because the number of atoms © joins in a real diamond is completely variable - depending on the size of the crystal. The physical properties of diamond diamond Ã ¢ â ¬ Â ¢ has a very high melting point (about 4000 Â ° C). The carbon covalent bonds in the carbon are very strong divided into the whole structure before the merger occurs. Ã ¢ â,¬ â ¢ is very difficult. This is again due to the need to break the very strong covalent bonds operating in 3 dimensions. Ã ¢ â,¬ â ¢ does not lead electricity. All electrons are securely held between atoms and are not free to move. Ã ¢ â,¬ â ¢ is insoluble in water and organic solvents. There are not enough attractions that may occur Solvent molecules and carbon atoms that could exceed attractions among carbon atoms covalently bound. The giant covalent structure of graphite graphite has a layered structure which is quite difficult to draw convincing in three dimensions. The following diagram shows the layout of the atoms in each level and the way the layers are spaced. The graphite bond each carbon atom uses three of its electrons to form simple ties to its three neighbors. That leaves a quarter electron in the bond level. These "reserve" electrons in each carbon atom become delocalized on all the foil of atoms in one level. They are no longer directly associated with a particular atom or a couple of atoms, but are free to wander throughout the sheet. The important thing is that delocalized electrons are free to move anywhere within the sheet - each electron is no longer fixed to a particular carbon atom. However, there is no direct contact between the electrons delocalized in a sheet and those in the adjacent sheets. Atoms within a sheet are held together by strong covalent bonds - stronger, in fact, than in diamond due to the additional bond caused by delocalized electrons. So what's he holding the sheets together? In Graphite you have the maximum example of van der waals dispersion forces. Since delocalized electrons move into the sheet, very large temporary dipoles can be installed which induce opposite dipoles in the sheets above and below - and so on throughout the graphite crystal. The physical properties of graphite graphite â€ ¢ has a high melting point, similar to that of the diamond. To dissolve graphite, it is not enough to loosen one sheet from another. You have to break the covalent bond throughout the entire structure. It has a soft and slippery feeling, and is used in pencils and as dry lubricant for things like locks. You can think of Graphite rather as a card pack - each card is strong, but the cards slip on each other, or even fall completely the package. When using a pencil, the sheets are rubbed and stick to the paper. • It has a lower density of the diamond. This is because of the relatively large amount of space "precated" between the sheets. â€ ¢ It is insoluble in water and organic solvents - for the same reason why the diamond is insoluble. Attractions between solvent molecules and carbon atoms will never be strong enough to overcome strong covalent bonds in graphite. â€ ¢ leads electricity. The delocalized electrons are free to move in all sheets. If a piece of graphite is connected to a circuit, the electrons may fall one end of the sheet and be replaced with new at the other end. The structure of silicon dioxide, silicon dioxide SIO2 is also known as silicon oxide (IV). The giant covalent structure of silicon dioxide are three different forms of silicon dioxide crystal. The simplest to remember and draw is based on the diamond structure. The crystalline silicon has the same structure as the diamond. To turn it into silicon dioxide, all you have to do is change the silicon structure by including some oxygen atoms. Note that each silicon atom is filled with its neighbors by an oxygen atom. Do not forget that this is only a small part of a giant structure that extends over all 3 sizes. The physical properties of silicon dioxide of silicon dioxide â€ ¢ has a high melting point - varying depending on what the particular structure is (remember that the given structure is only one of the three possible structures), but around the 1700 ° C. Very strong covalent bonds of silicone-oxygen must be divided into the whole structure before you areThe fusion. Ã ¢ â,¬ â ¢ It is difficult. This is due to the need to break the strong covalent bonds. Ã ¢ â,¬ â ¢ does not lead electricity. There are no delocalized electrons. All electrons are securely held between atoms and are not free to move. Ã ¢ â,¬ â ¢ is insoluble in water and organic solvents. There are no attractions that may occur between solvent molecules and silicon or oxygen atoms that may exceed covalent bonds in the giant structure. The uses of Silica i) Quartz glass is used for the production of optical instruments. ii) Colorful quartz is used for the production of gems. iii) Sand is used in the manufacture of glass, porcelain, sandpaper and mortar etc. iv) Sandstone is used as a construction material. Co-ordinates (Dative Covalent) Bonding Co-ordinates (dative covalent) bonding A covalent bond consists of two atoms that share a pair of electrons. Atoms are held together because the pair of electrons is attracted by both nuclei. In the formation of a simple covalent bond, each atom provides an electron to the bond - but this should not be the case. A coordinated bond (also called a dative covalent bond) is a covalent bond (a shared pair of electrons) in which both electrons come from the same atom. The reaction between ammonia and hydrogen chloride If these colourless gases are allowed to mix, a white smoke often forms of solid ammonium chloride. Ammonia ions, NH4+, are formed by the transfer of a hydrogen ion from hydrogen chloride to only a couple of electrons on the ammonia molecule. When the ammonium ion is formed, NH4+, the fourth hydrogen is attacked by a dative covalent bond, because only the hydrogen core is transferred from chlorine to nitrogen. Hydrogen electron is left behind chlorine to form a negative chloride ion. Once the ammonium is formed it is impossible to tell any difference between the dative covalent and ordinary covalent bonds. Although the electrons are shown differently in the diagram, there is no difference between them actually. Intermolecular Bonding - Van Der Waals Forces (a) Van Der Waals Forces Intermolecular attractions are attractions between a molecule and a nearby molecule. Attractive forces that hold a single molecule together (for example, covalent bonds) are known as intramolecular attractions. All molecules experience molecular attractions, although in some cases these attractions are very weak. Even in a gas like hydrogen, H2, if you remove molecules down cooling the gas, attractions are large enough for molecules to stay together at the end to form a liquid and then a solid. In the case of hydrogen, attractions are so weak that molecules must be cooled to (-252°C) before attractions are enough to condense hydrogen as liquid. The intermodal attractions of helium are even weaker: molecules do not stick to form a liquid until the temperature drops to (-269°C). Polar hydrogen bond molecules, such as water molecules, have a weak and partial negative charge in a region of the molecule (the oxygen atom in water) and a partial positive charge elsewhere (hydrogen atoms in water). Thus, when water molecules are close together, their positive and negative regions are attracted by the opposite-loaded regions of nearby molecules. The adhesive force, shown here as a dotted line, is called a hydrogen bond. Each water molecule is linked to hydrogen to four others. Hydrogen bonds formed between water molecules represent some of the essential and unique properties of water. The attraction created by hydrogen bonds keeps the water liquid on a wider range of temperature that is found for any other molecule its size. The energy needed to break more hydrogen bonds causes water to have a high heat of vaporization; i.e. a large amount of energy is necessary to convert liquid water, where molecules are attracted throughtheir bonds of hydrogen, water vapor, where they are not. Liquid water and hydrogen bond Why is water a liquid? In many ways, water is a miraculous liquid. Since the atoms of hydrogen and oxygen in the molecule carry opposites (although partial) charged, the water molecules nearby are attracted to each other as a tiny minusculeHydrogen bonding makes water molecules "Stick" together. This makes water with high melting and boiling points compared to other covalent compounds such as ammonia (NH3) which have a similar molecular mass, but the gases ice and hydrogen are glued the structure that is formed in the solid ice crystal has actually great holes. Therefore, in a given volume of ice, there are less water molecules than the same volume of liquid water. In other words, ice is less dense than liquid water and floats on the surface of the liquid. Surface tension and hydrogen bond While we have just discussed, nearby water molecules are attracted to each other. The molecules on the surface of liquid water have fewer neighbors and, consequently, have a greater attraction for the few water molecules nearby. This advanced attraction is called surface tension. It makes the liquid surface slightly more difficult to break than inside. Water as solvent The partial charge that develops through the water molecule helps to make it an excellent solvent. Water dissolves many substances from the surrounding charged particles and "throwing" in solution. For example, the common table salt, sodium chloride, is an ion substance containing alternating ions of sodium and chlorine. When the table salt is added to the water, the partial loads on the water molecule are attracted by NA+ and eliteri. Why does ethanol have a higher boiling point than metoximetine? Ethanol, CH3CH2-O-H and Metossymethane, CH3-O-CH3, both have the same molecular formula, c2h6o. They have the same number of electrons and a length similar to the molecule. Van der Waals attractions (both dispersion forces and dipole-dipole attractions) in each will be the same. However, ethanol has a hydrogen atom directly attached to oxygen - and that oxygen still has exactly the same two solion pairs as in a water molecule. Hydrogen bonding can occur between ethanol molecules, although not as effective as in water. Hydrogen bonding is limited by the fact that there is only one hydrogen in each ethanol molecule with sufficient ¤ + tax. In the Xethan method, solitary pairs on oxygen are still there, but hydrogens are not sufficiently ¤ + for hydrogen bonds to form. Except in some cases quite unusual, the hydrogen atom must be directly attached to the very electronic element for the bonding of hydrogen. The boiling points and ethanol and metoximethane show the dramatic effect that hydrogen bond has on the viciousness of ethanol molecules: ethanol (with hydrogen gluing) 78,5 ° C Metosethyyymethane (without hydrogen bond) -24.8 ° C hydrogen bond in Ethanol raised its boiling point about 100 ° C.it is important to realize that there is a hydrogen bond in addition to Van der Waals attractions. For example, all the following molecules contain the same number of electrons and the first two are much of the same length. The highest boiling point of butan-1-ol is due to the additional hydrogen bond. 4. Metal bonding Metal atoms have relatively few electrons in their outer shells. When packed together, each metal atom loses its external electrons in a "SEA of free electrons (or mobile electrons). Having lost electrons, atoms are no longer electrically neutral. They become positive ions because they lost electrons but the number of protons in the nucleus remained unchanged. Therefore the structure of a metal is composed of positive ions packed together. These ions are surrounded by electrons, which can move freely between ions. An ion is a loaded particle made byAtom from loss or electrons gain. Metal atoms lose more easily electrons, so they become positive ions. In this way they get a more stable electronic arrangement, usually that of the nearest noble gas. These free electrons are delocalized (not limited to orbiting a positive ion) and form a sort of electrostatic electrostatic holding the structure together. In an electric circuit, metals can lead electricity because mobile electrons can move through the load of the structure. Its type of bonding (called Boding Metallic) is also present in alloys. Alloys, for example welding and brass, will lead electricity. The physical properties of metals: this strong bond generally results in dense and strong materials with high fuse and boiling points. Usually a relatively large amount of energy is required to merge or boil metals. a. Metals are good conductors of electricity because these "free" electrons carry charge of an electric current when a potential difference (tension!) It is applied through a piece of metal. B. Metals are also good heat conductors. This is also due to free moving electrons. Non-metallic solids lead hot energy to more vibrant vibration, knock against the most strongly vibrant cooling device atoms to pass the kinetic energy of particles. In metals, as well as this effect, the high "hot" kinetic energy electrons " move freely to transfer the kinetic energy of particles more efficiently to the freshest atoms." C. Typical metals also have a silvery surface but remember that this can be easily blurred by corrosive oxidation in air and water. D. Unlike ionic solids, metals are very malleable, can be promptly bent, pressed or hammered in shape. Assistance 3 1. The table shows some properties of Diamond and Graphite. Diamond Graphite Colorful, Clear Crystals Black Shiny Solid Natural Satisfaction Natural substance Known Flakes Easily Known Non-Conductor Electricity Driver (A) Why Could You Expect Diamonds and Graphite To Have The Same Properties? (b) Explain why the diamond and graphite do not have the same properties. (c) Explain why the diamond does not lead electricity but graphite does.

(d) Write a balanced equation, including state symbols, for the reaction that occurs when graphite burns in excess of air. 2. Carbon dioxide, CO2 and silicon dioxide, SiO2, both widely in nature. They also have some similar physical properties; For example, both are electrical insulating. (a) (i) How are the electron agreements of a carbon atom and a silicon atom the same? (ii) Suggest why carbon dioxide and silicon dioxide have some similar properties. (b) (i) Suggest the type of bond present in carbon dioxide and silicon dioxide. Give a reason for your answer. (iii) Suggest the type of structure present in silicon dioxide. Give a reason for your answer. (iii) Describe the structure of solid carbon dioxide. 3. A hydrogen chloride molecule, HCL, is covalent. (a) (i) Draws a point and a cross diagram of a hydrogen chloride molecule. It only shows the outside electrons. (ii) Explain why liquid hydrogen chloride has a low boiling point. (b) If dissolved in water, hydrogen chloride forms hydrogen ions (H +) and chloride ions (CL * "). (i) Draw a diagram of a chloride ion, showing only external electrons. (ii) The electrolysis of this solution produces hydrogen. Write the equation showing the formation of hydrogen by hydrogen ions. 4. The formula for a water molecule is H2O. (a) How many atoms are there in a water molecule? (b) Draw a point and cross diagram to show the disposition of the outer shell electrons in a water molecule. What kind of connection is there in water molecules? 5. (a) Points and cross diagrams show how a sodium atom binds with a chlorine atom to form chlorideThe binding in sodium chloride is ionic. The compounds with ion tie usually have high fusion points. (i) What do the points and crosses represent in diagrams? (ii) What is the name of the negative ion present in sodium chloride? (iii) What does the high melting point of sodium chloride suggest on the strength of ion ties in the sodium chloride? (b) Two chlorine atoms can bond together as shown in the chart below. This type of bond is called covalent. Covalent bonds are formed among non-metal atoms. Describe to describe A covalent bond is formed between two chlorine atoms. (c) Hydrogen bonds with chlorine to form the compound hydrogen chloride, HCL. (i) Suggest the type of binding in hydrogen chloride. Date a reason for your reply. (ii) the relative atomic mass of hydrogen is 1.0. Use the periodic table to find the relative atomic mass of chlorine. 9.0.0 The General Preparation of Salts Salts salts are generally ionic compounds formed by the reaction of an acid with a base. The preparation of these salts involves the treatment of different metals and not metals and their compounds with various acids, bases etc. However, some of them can be prepared with a direct combination of the elements concerned or even with indirect paths. d) treating hydroxides with acids g) the insoluble precipitation salts are the reaction in which a solid is formed by the action between two or more fluids, for example, calcium carbonate is precipitated when carbon dioxide is passed through Lime water. Evaluation 4 1. a) A solution of zinc chloride can be prepared by adding excess zinc carbonate to dilute hydrochloric acid. At the end of the reaction, the remaining zinc carbonate is removed from filtration. (i) Explain why excess zinc carbonate is used. (ii) Another zinc compound that reacts with diluted hydrochloric acid to form zinc chloride solution. (b) Silver chloride can be made by reacting the silver nitrate solution with hydrochloric acid. (i) Write the ionic equation, including status symbols for this reaction. (ii) explains why pure silver chloride cannot be made by adding silver carbonate to hydrochloric acid. 3. Two students have made insoluble salt, lead sulfate, and wrote these notes on the experiment. â € œAnbm 25 cm3 of lead nitrate solution and slowly added 25cm3 of acid to it. The mixture turned into cloudy blank. We mixed the mixture and filtered to get solid lead sulfate .â € ™ (a) Describe a safety precaution that students should take during this experiment. (b) (i) What acid has been added to conduct the nitrata solution to do lead sulphate? (ii) draw, and the name, the piece of apparatus that must be used to measure 25 cm3 of acid. 3. Lead chloride can be prepared by diluted hydrochloric acid and lead nitrate solution. The steps to use are listed below. They are not in the correct order. Filter the mixture. B Measure the diluted hydrochloric acid of 25 cm3 and 25 cm3 lead nitrate solution. C Wash the lead chloride with distilled water. D Mix the diluted hydrochloric acid with lead nitrate solution. And dry lead chloride. (a) Place the steps in the correct order, using the letters, A, B, C, D and E. (b) (i) What can be used to measure 25 cm3 of diluted hydrochloric acid? (Ii) As a safety precaution must be taken during the measurement of the acid? (C) When the dilute hydrochloric acid is mixed with the lead nitrate solution, a solid precipitated of lead chloride. The lead chloride is formed as a solid because © does not dissolve in water. What is the general name for any solid formed by mixing solutions? d) Name two pieces of equipment required to filter the mixture. (E) As you can dry the wet chloride sild lead? 4. The table salt contains sodium chloride. â Lo-shuffles to a different alternative to table salt. It contains potassium chloride. (A) (i) Which element is found in both sodium chloride and in potassium chloride? (Ii) Give the symbol for an atom of this element. (B) (i) In which group of the periodic table you are located sodium? (Ii) In which group of the periodic table is potassium? Why do you expect sodium chloride and potassium chloride to have similar properties? (c) Potassium chloride is soluble in water. What do you see when a small amount of solid potassium chloride is mixed in a large volume of water? 10.0.0 Effect of an electrical current on substances Introduction In any chemical reaction, existing chemical bonds are broken and new chemical bonds are formed. Therefore, all chemical reactions are basically electrical becauseuse involved somehow or another in all types of chemical bond. Many chemical reactions are so used to produce electricity. As electricity involves the flow of electrons, these reactions are interested in transferring electrons from one substance to another. Conductors and insulators The ability to conduct electricity is the main simple distinction between elements that are metal and not metal. 1. Conductors A conductor is a material that leads electricity, but has not chemically changed in the process. All metals and graphite are electricity conductors. 2. Insulators An insulator is a material that does not lead electricity. Such materials do not have free electrons. Synthesis of common electrical conductors These materials carry an electrical current by electrically charged particles freely, when a potential difference (tension) is applied through them, and include: 1) All metals (many or solid) and non-metallic carbon (graphite). This conduct involves the movement of free or delocalized electrons (and- charged particles) and does not involve any chemical change. 2) Any melted or dissolved material in which the liquid contains free ions in motion is called electrolyte. Ions are charged particles, for example. Na+ sodium ions, or chloride chloride chloride, and the ions, because they are charged particles. The movement of opposite charges during electrolysis is due to the attraction in the electric field produced by the potential difference (the voltage). Liquids that lead must contain ions freely moving to transport the current and complete the circuit. You can't do electrolysis with a solid ionic! The ions are too tightly bound by chemical bonds and cannot flow from their ordered situation! When ionically linked substances are melted or dissolved in water, ions are free to move. However, some covalent substances dissolve in water and form ions. for example HCl hydrogen chloride, dissolves in water to form H+Cl-(aq hydrochloric acid. Electrolytes and not electrolytesHowever, if the compound is not able to ionize does not conduct electricity is called a non-electrolyte. In general, the extent to which an electrolyte can break into ions classifies a substance as a strong electrolyte or weak. This gives a measure of the degree of dissociation (a) of an electrolyte. Based on this degree electrolytes can be classified as strong or weak electrolytes and not electrolytes. Strong electrolyte A strong electrolyte, such as a solution of sodium chloride dissociations or ionizing completely or almost completely to form free mobile ions in solution or molten form. The more the availability of free mobile ions in an electrolyte, the more its ability to carry or conduct current i.e. the stronger the electrolyte. The ability to conduct current can be observed by setting a cell as shown in figure 4.4. The bulb shines brightly. For example, sodium chloride also in crystalline form is made up of ions. But ions are not mobile so as not to conduct electricity and bulbs does not turn on. When melted or dissolved in water, it completely dissociates into free and mobile ions. Pure sulphuric acid mainly exists in the form of molecules. But when mixed with water, it almost completely breaks into free mobile ions. Electrolyte Debts A weak electrolytic ionizing or dissociates only partially to form free mobile ions. Most electrolyte remains as non-ionized molecules. For example, in acetic acid, the number of its dissociated ions (acetate and hydrogen ions) is lower than the total quantity of acetic acid molecules present. Similarlyof ammonium the number of its dissociated ions (the ions of ammonium and hydroxyle) is lower than the total quantity of the molecules present. So both of these compounds are weak electrolytes. When the number of mobile ions is low in an electrolyte, the minor is its ability toor conduct current that is the weakest is electrolyte. This is observed by setting the cell as shown in figure 4.5. The light bulb is less bright. If a liter of a solution containing a molar mass of sulphuric acid, and a liter of a solution containing a molar mass of citric or acetic acid, they are subjected to the same current, then: The bulb shines brilliantly in the case of sulphuric acid, demonstrating it is a strong electrolyte The bulb shines dimly in the case of citric or acetic acid, showing that it is a weak electrolyte. Non-electrolyte A non-electrolyte does not provide ions in a solution and therefore the current does not flow through such a solution. The bulb in the given configuration does not dazzle (Fig.4.6). Some examples of non-electrolytes are: alcohol, carbon tetrachloride, carbon disulphide. Ionization The process of conversion of a neutral atom into charged ions to complete its octate is known as ionization. In this process, the neutral atom loses or gains electrons. The particle that loses the electrons gains positive charge equal to the number of lost electrons, while the particle that earns electrons gains negative charge equal to the number of earned electrons. When atoms from metal elements combine with non-metal, they do so by transferring electrons from one atom to another, forming compounds with "ionic or electrovalent bonds". The neutral atom that loses an electron becomes a cation and the neutral atom that acquires an electron becomes an anion. For example, when a sodium atom is combined with a chlorine atom to form sodium chloride, the sodium atom loses an electron and becomes positively charged ion. The chlorine atom gains electron and becomes ion charge negatively. The dissociation electrolytic substances consist of ions in the solid state. The ions located in front are held together by strong electrostatic force of attraction. Because of these forces ions cannot move. However, when these substances are dissolved in water or molten, ions are free from this bond. Thus the break of an electrovalent compound in free mobile ions when dissolved in water or when molten, is called electrolytic dissociation theory of electrolytic dissociation The main ideas of the theory or ion theory of electrolytic dissociation are as follows: On dissolving in water an electrolyte, breaks into free cations and anions. The energy associated with mobile expenses is called current or electricity. The ions carry an electrical charge and also allow the electricity flow through it. The electricity flow is due to the flow of ions. The total number of positive and negative charges of ions in the compound is equal. Electrolysis divides a compound: When substances that are made of ions are dissolved in water, or molten material, they can be broken (decomponent) into simpler substances by passing an electrical current through them. This process is called electrolysis. Since it requires an energy input, it is an endothermic process. During electrolysis: Positive metal ions or hydrogen ions move to negative electrode where the lowest metal in the reactivity series is discharged from electron gain (a reduction process). They are known as cations because they move away to the cathode. Non-metallic negative ions derive from positive electrode (anode) where less reactive ions are still discharged from the solution for electron loss (oxidation). They are known as anions because they move away to the anode. In electrolyte (solution or fusion of free ions in motion), metal or hydrogen ions move to the negative electrode (cations attracted by cathode), for example in the diagram, Na+ sodium ions, move to the electrode ofand negatively charged ions move to the positive electrode (anion attracted to anode), for example in the diagram, chloride ions. During electrolysis, gases can be given out, or metals dissolve or are depositedThe electrodes. In summary, the following substances are electrolytes: Salts Molten salts solutions in water solutions of acid solutions Alcalis solutions metal conductivity: electronic flow (carry cards) is a property of elements, graphite and alloys that takes place in solids and liquids Without chemicals change takes place. Electrolytic conductivity: ion flow (carry cards) is a property of ionic compounds takes place in liquids (fused salts) and solutions but the solidarity chemical decomposition does not take place. Electrolysis circuit There are two ion movements in the electrolyte flowing in opposite directions. Positive cations eg. Na + attracted to the negative cathode electrode. Negative Anions E.g. Cl - attracted to the positive anode electrode. No electron flow in the solution. Flow only in metal wires or carbon electrodes (graphite) of the external circuit. The molten or dissolved materials (electrolytes) are usually acids, alkalis or salts and their electrical conduction is usually accompanied by chemical changes to eg. decomposition. The liquids that lead must contain removable ions freely to transport the current and complete the circuit. The electrolysis cannot be performed with an ionic solid. This is because ions are too closely kept by chemical bonds and cannot flow. When substances linked in ionic letters are merged or dissolved in water, the ions are free to move. However, some covalent substances dissolve in water and form ions. The hydrogen chloride (HCl) is covalent. However it dissolves in water to form the "ionic" hydrochloric acid H + CL- (AQ) reactions for cathode reactions (reduction) (-) negative cathode in which the reduction of positive attention attracted is per electronic gain (reduction) To form metal or hydrogen atoms [from MN + or H +, N = numeric charge]. Electrons come from the positive anode. Hydrogen ions are reduced to hydrogen gas molecules. The electrolysis of many diluted salts or acid solutions makes hydrogen gas for reduction as shown. The 2H + (AQ) + 2E-H2 (G) copper (II) ions are reduced to copper atoms in electrolytic purification or electroplazing using the copper sulphate solution (II). CU2 + (AQ) + 2E-CU (s) Silver ions reduced to silver atoms Silver Electroplating AG + (AQ) + E-AG (s) Anode reactions (oxidation) Positive anode is the place in Which oxidation of the anion or ation is electron loss. Non-metallic negative anoni are attracted and can be oxidized to the free element. For example, in electrolysis of melted chloride salts or their concentrated aqueous solution or concord. Hydrochloric acid, oxidized chloride ion to chlorine gas molecules. 2Cl- (L / AQ) CL2 (G) + 2E- in electrolysis of melted oxides, eg. Anode reaction in aluminum extraction from melted bauxite, oxide ion oxide ions to oxygen gas molecules. 2O2- (L) O2 (G) + 4E- The electrons released by this process travel around the circuit and are donated to the attacks (reduction). Electrolysis of many salt solutions such as sulphates, sulfuric acid etc. It gives oxygen. Lithium hydroxide oxidized to oxygen gas molecules. 4OH- (AQ) 2H2O (L) + O2 (G) + 4e- Factors that determine the electrolysis products The successfully released ions (or downloaded) to the electrodes depend on three factors: 1. The ion position in the electrochemical series 2 . the ion concentration in the solution 3. the nature of the electrode 1. the ion position in the electrochemical series this is probably best expressed as the location of the ions in the electrochemical series. The ions that are lower in electrochemical series are downloaded in preference to those above them. For E.G., if a solution has potassium ions and copper ions, copper ions accept electrons and will be discharged first as the copper atoms. Potassium ions will not be affected. 2. The concentration of ions when two ions with similar reactivity are in competition, the relative concentration of the two ions becomes an important factor. If an electrolyte contains a higher high of ions, which are higher in the electrochemical series than those that are lower, then these ions are discharged in preference to the lower ones. For example, a sodium chloride solution in water contains two types of anions, i.e. chloride ions (Cl-) and hydroxyl ions (OH-). Hydroxyle ions are lower in the electrochemical series than chloride ions. But if the concentration of chloride ions is much higher than that of hydroxyl ions, then chloride ions are discharged first. NaCl Solution Electrolysis at different concentration 3. The nature of the electrode Usually inert electrodes such as graphite or platinum are used for electrolysis. These electrodes do not interfere with the reactions that occur on the electrode surface which simply act as a connection point between the electrical circuit and the solution. However, if metal electrodes are used in the same metallic ion solutions, they can be involved in dissolving reactions as ions leaving their electrons behind. Example: Electrolysis of sodium chloride solution The ions present in the solution are: Na+, Cl... H+, OH- The positive ions are attracted by the negative cathode. There is competition between sodium ions and hydrogen ions. Since ion hydrogen is lower in the electrochemical series than sodium sodium, hydrogen ions are preferably reduced and hydrogen gas is produced to electrode (canisters are seen) 2H+ + 2e H2 To the anode There is competition between negative ions to positive anode. Chloride ions compete with hydroxide ions to release their electrons to the anode. If the solution is quite concentrated chloride ions preferably lose electrons to become chlorine atoms (and then molecules). 2Cl-Cl2 + 2e remaining ions in solution The ions that are removed from the solution, then, are hydrogen ions and chloride ions. This means that sodium ions and hydroxide ions remain in the solution - that is sodium hydroxide is also produced. Note: When the solution of chloride ions is diluted then OH, ions are released preferably to the anode. Diluted sulphuric acid electrolysis (water electrolysis) Water is a poor electricity conductor. However, it can be done to decompose if a certain diluted sulphuric acid is added. Once Hofmann voltammeter below can be used to keep gas products separated. 4OH+(aq) 2H2O(l) + O2(g) + 4e-A cathode 2H+(l) + 2e- H2(g) After a while, the volume of gas in each arm can be measured and tested. Oxygen is collected at the anode. The volume ratio is about 2:1 for hydrogen and oxygen respectively. In fact, this experiment is the electrolysis of water. Example: Electrolysis of copper sulphate solution II The ions present in the solution are: Cu2+, SO22-,H+, OH- The positive ions are attracted by the negative cathode. There is competition between copper ions and hydrogen ions. As hydrogen is higher in the electrochemical series than copper is, copper ions are preferably reduced and copper metal is deposited to the electrode (the rose layer is observed). Cu2+ + 2e Cu at the anode There is competition between negative ions at the anode. Sulphate ions compete with hydroxide ions to release their electrons to the anode. Hydroxide ions are lower in the series and are preferably released as oxygen gas (the cylinders are seen) and water. 4OH- 2H2O + O2 +4e OILRIG Oxidation is loss, Reduction is gain (of electrons) The oxidizing agents are easily reduced. Reduction agents are easily oxidized. The remaining ions in solution The ions that are removed from the solution, then, are the ions of copper and hydroxide ions, this means that thehydrogen and sulphate ions remain in the solution - that is, sulfuric acid is also produced. The solution changes color from blue to color. Electroplating Electroplating is a deposit process of a thin layer of a thin and upper metalchrome, zinc, nickel, gold etc.) above the article of a cheaper base and metal (such as iron, copper, brass), with the help of electric current. Uses Electroplating is very useful due to the following reasons: Surface protection, for example nickel iron plating to prevent corrosion. Makes attractive item for example, silver or gold plating on brass etc. Repair of thinner parts of the machine. Process The electroplating process involves the following steps: Before electroplating the metal surface is cleaned thoroughly. First, an alkaline solution is used to remove fat and then it is treated with acid to remove any layer of oxide. It is then washed with water. The article to be electrolyzed is cathode as the metallic ions are positive and therefore are deposited on the cathode. The anode is made of pure metal, which must be covered in the article. The electrolyte is the metal salt to be coated on the article. A direct current (D.C.) is passed through the electrolyte. The anode dissolves, depositing the metallic ions from the solution of the article in the form of metallic coating. The low current switch continued for a long time to ensure a uniform coating. Electrolysis of copper sulphate solution 11 with copper electrodes The ions present in the solution are: Cu2+, SO42-,H+, OH- The positive ions are attracted by the negative cathode. There is competition between copper ions and hydrogen ions. Since hydrogen ions are higher in the electrochemical series, copper ions are preferably reduced and copper metal is deposited to the electrode (a pink layer is observed) Cu2+ + 2e Cu to the anod In this case the electrode is made of copper and it is easier for the copper to dissolve, leaving its electrons behind the anode than for any other ion to be released. Cu Cu Cu2+ + 2e remaining Ions in Rame solution is deposited to the cathode and is dissolved to the anode. Therefore the concentration of copper ions in solution remains constant. This can be used as a method of purification of copper, as only pure copper is deposited at the cathode. In this purification an anod made of impure copper is turned to pure copper to the cathode leaving the impurities behind (the mud in the diagram). The basic rules for electroplating a metallic object M are as follows: The object must be made the cathode Electrolyte must be a solution of a metal salt M, The anode is made of a metal strip M Electrolysis of lead Bromide. Lead bromide must be heated until it is melted before it will lead electricity. Electrolysis separates the molten ionic compound in its elements. Reactions to each electrode are called half equations. Equations are written so that the same number of electrons take part in each equation. Pb2+ + 2e- Pb (Cathode Load Metal (-)). 2Br-Br2 + 2e- (gas bromide to (+) anod). Lead ions acquire electrons (reduction) to form lead atoms. Bromide ions lose electrons (oxidation) to form bromide atoms. Bromine atoms combine to form bromide gas molecules. The general reaction is: PbBr2(l) Pb(s) + Br2(g) Summary Reactive metals (more reactive than hydrogen) are never deposited during electrolysis of aqueous solutions. If metal is from a more reactive metal of hydrogen, then hydrogen gas is released to the cathode. Halide ions (chloride, bromide and iodine) are released preferential and if these are not present, hydroxide ions of water are released to the anode. 11.0.0 Carbon and some of its Carbon compounds occur in nature in large amounts in coal, oil and carbonates, especially in CaCO3 limestone. Coal is almost pure carbon, butcarbon form does not have a clearly defined crystalline shape and is classified as amorphous carbon. Other forms of amorphous carbon are black carbon and black lamp. The alloy is the existence of the same chemical in different physical forms. Carbon anthropists with different crystalline crystallineexists. These are diamonds, graphite. Carbon is a chemical element in the periodic table that has the symbol C and the atomic number 6. It is an abundant, tetravalent non-metallic element, and has different altophotic forms: Diamond Diamond is the most pure form of natural carbon. It occurs as small crystals embedded in rocks. These should have been formed by carbon crystallization under extreme pressure and temperature inside the earth. Nowadays, synthetic industrial diamonds are being produced by submitting graphite at very high temperatures and pressures. Diamond carbon atoms have the tetrahedral structure. Each carbon atom is surrounded by four other atoms that form together the tetrahedral structure, as shown in Figure 10.1. Diamond physical properties 1. The diamond is the most pure form of carbon. 2. It is the most dense than all carbon allotropics. 3. The tetraedral diamond structure makes it the natural substance earlier. It is fragile and transparent. 4. Pure diamond is colorless. 5. Diamond has a very high refractive index. When correctly cut and polished, it allows light to undergo a total internal reflection that makes it very brilliant. 6. It is transparent to light and X-rays. This property is used to identify a real diamond from a fake, for example, the glass can be made shine as a diamond, but it is opaque x-ray. 7. Due to Of the chain there are no free electrons that can move in the diamond structure. So it's a non-conductor of electricity, but extremely good heat conductor. 8. It is insoluble in all known solvents. Chemical diamond owners 1. The diamond is chemically very inert. It does not react with any substance at ordinary temperatures. 2. When heated in oxygen at around 800oc, completely burns to form carbon dioxide. This shows that the diamond is pure carbon shape. 3. When it heats up in the absence of air at 1500OC, the atoms are rearranged to form graphite. 4. Diamond is struck slowly from molten sodium carbonate, forming carbon monoxide. 5. When heated with concentrated sulfuric acid and chromed potassium, it is oxidized to carbon dioxide. Diamond uses 1. The diamond is used as a gem (except the black variety) for its brilliance. 2. Black diamond variety is used for glass cutting, such as drilling tips for industrial drills, to polish other diamonds, etc. Graphite unlike the tetrahedral layout of the diamond atoms, graphite carbon atoms are arranged in the form of hexagonal rings in layers (fig.10.2). Each carbon is linked to only three other carbon atoms at that level. Several graphite layers are held together by rather weak forces. So they can slide each other. This is a reason why the graphite scates easily and can mark impressions on the substrates. Because of this property, it is also used as a lubricant. Physical Property 1. Graphite Graphite is black-white crystalline substance. 2. It has a soft and oily texture, but has a metallic luster. 3. The specific gravity of the graphite is of only 2.2 g cm-3. 4. Due to the presence of an electron free valence, is a good conductor of electricity. 5. It is also one of the stable forms of carbon. 6. The structure of graphite has hexagonal rings arranged in layers. chemical Graphite Graphite 1. Property is inactive and inert to almost all chemicals. 2. It does not burn in the air, even if heated at high temperature. But if heated in oxygen, it burns completely to form only carbon dioxide. 3. It is also oxidized to carbon dioxide when it is heated with concentrated sulfuric acid and potassium dichromate. Graphite Uses 1. The graphite is used to make the 'meat' of pencils. 2. You in the production of refractory crucibles, which can withstand very high temperatures. 3. Graphite being an electricity conductor finds application in making electrodes. 4. It is used in polishing and varnishing. 5. Graphite is used as lubricant in machines, which must be operatedTemperatures. All these machines cannot be lubricated with oils, grease, etc. When vaporize immediately at high temperature. 6. It is used to create electrotypes for printing 7. Graphite is widely used in nuclear reactors, to absorb neutrons. This helps to moderate nuclear reaction. Amorphous carbon apart from Diamond and Graphite, which are crystalline carbon shapes, all other carbon shapes are carbon amorphous amorphous. 1. Coca-Coke is the carbon alotropium amorphous, derived from coal. When the coal undergoes destructive distillation, it produces two carbon allotropts, ie cola cola and gas carbon. Destructive distillation is a chemical process, which involves the breaking of a complex substance by heating it in the absence of air. Uses of Coca Cola is a good fuel and when it turned it out to burn almost smoke. It is no heat director and electricity. It acts as a good reducing agent and is widely used in the production of gas manufacturers, aquatic gas and hydrogen. 2. The coal of sugar coal can be obtained a coal of cane sugar dehydrating sugar, holding it with concentrated sulfuric acid or heating it in the absence of air. It is the most pure form of carbon amorphous variety. It is used in the preparation of artificial diamonds. 3. Woodwood wood charcoal is obtained from destructive wood distillation. The main formed products are charcoal. Property . Wood coal is black, porous, fragile and soft. Although more dense than water can float on the water, since it contains many air bubbles trapped in pores. Wood coal is not a conductor of electricity. Use wooden charcoal is used for more than fuel while catching fire easily. It is used in the gas masks as an adsorbent. It is also used as a bleaching agent for sugar, oils, alcohol, petroleum products, etc. It is used in gun powder which is a mixture of coal dust, potassium nitrate and sulfur. 4. Charcoal of animal coal is prepared by the destructive distillation of animal bones. Is porous and can adsorize the material to be colored. It is also used in the sugar industry to bleach the sugar. Chemical carbon properties 1. Carbon combustion: Carbon reacts with oxygen to form two oxides, carbon dioxide, CO2 and carbon monoxide Co. The proportions of these two oxides formed during combustion depend on the conditions. At about 500 âºC, carbon dioxide is produced almost exclusively, provided that oxygen is excess: c (s) + O2 (g) CO2 (g) at higher temperatures, or when the oxygen supply is Limited, carbon monoxide is the main product. 2C (S) + O2 (G) 2CO (G) 2. The reaction with acid reacts in carbon with concentrated sulfuric acid and concentrated nitric acid. Nitric acid is a powerful oxidizing agent. Both acids observe carbon to carbon dioxide gas. Carbon + Carbon Dioxide sulfuric acid + sulfuric anhydride + dioxide sulfur + water c / s) + 2H2SO4 (CONC) CO2 (G) + SO2 (G) + 2H2O (L) carbon + carbon dioxide acid + nitric carbon dioxide + nitrogen (IV) oxide + water c (s) + 4hno3 (CONC) CO2 (G) + 4NO2 (G) + 2H2O (L) 3. Reduce the action of the carbon when the carbon is mixed with iron oxide (III) and strongly heated, it is produced in pure iron metal. Carbon monoxide + iron (III) oxide, carbon dioxide + iron. 3CO (G) + FE2O3 / i 3CO2 (G) + 2FE (L) Carbon (IV) Oxide: carbon dioxide is readily prepared by the action of diluted chloric acids on the metal carbonates (calcium carbonate or marble normally). Vigorous effervescence occurs as bubbles of carbon dioxide are released. CaCO3 (s) + 2HCl (AQ) CaCl2 + CO2 (G) + H2O (L) Since the © Carbon is 1.53 times heavier as air, usually collected from moving upwards of air. In this case, it is collected from the downward shift of water. Carbon properties (IV) Physical properties of oxide dioxide Carbon dioxide is a colourless gas with a weak pungent smell. It does not burn or support combustion, except in extreme cases, and is not poisonous (it is the gas in sparkling fresh drinks). However, it can cause death by suffocation, whenPresent in sufficient concentrations. Carbonic anhydride is a linear molecule. The gas condenses to a liquid at 0 ° C under a pressure of 35 ATM. At normal pressure, carbon dioxide is condensed directly to a solid to -78.5 oC. This solid, known as dry ice, is widely used as a cooling agent. The solid carbon dioxide does not dissolve under normal atmospheric pressure, but passes directly into the gaseous phase, a process known as sublimation. Chemical properties 1. Reaction with water When carbon dioxide is dissolved in water, carbonic acid, H2CO3, is produced in small quantities: CO2 (G) + H2O (L) H2CO3 (AQ) Carbonic acid is a Weak diprotic acid that gives rise to salts known as carbonates, which contain co32-carbonate anion-. 2. Reaction with lime water The Limewater carbon dioxide test is a clear colorless calcium hydroxide solution (slammed calle). The calcium carbonate is precipitated when carbon dioxide is passed through a clear solution of calcium hydroxide in water. Lime water becomes milky as proof for the release of carbon dioxide. The aforementioned carbon dioxide reaction with potassium hydroxide is used to purify the air. When the air is passed through a potassium hydroxide solution, it absorbs carbon dioxide. Therefore, the air, which has passed for the first time through a watery potassium hydroxide, and then passed through the lime water, does not run the latter milky, as all carbon dioxide is absorbed by the hydroxide of Potassium 5. The natural carbon dioxide is slightly acidic. Yes turn blue Litmus red paper. During the rainy season, the blue Litmus paper is opened open in the laboratory slowly turns red, due to the presence of carbon dioxide in the air. 6. Combustibility Carbonic anhydride is not fuel, it is not a combustion supporter. A burning splinter or a burning candle is turned off, but metals like potassium, sodium, magnesium etc. continue to burn in carbon dioxide. Magnesium burned in carbonic anhydride Turn on a magnesium tape and present it in the carbon dioxide vessel. The magnesium tape continues to burn in carbon dioxide. Carbon deposits can be seen on the interior sides of the jar. At the ignition temperature, these metals are able to reduce carbon carbon dioxide by removing oxygen, ie, small black carbon solid particles are deposited inside the vessel. 7. Action on heated carbon when carbon dioxide is passed over red-hot carbon in the form of coal coal, carbon dioxide loses one of its two oxygen atoms. As a result, carbon dioxide is reduced and becomes carbon monoxide. At the same time hot carbon is also converted into carbon monoxide. Uses of carbon dioxide 1. In nature a) carbon dioxide is used in photosynthesis from green plants to produce carbohydrates. b) induce natural breathing. 2. Extense fires Fire fire extinguishers acid soda produce carbon dioxide to turn off fires. 3. As a coolant the solid carbon dioxide called "Dry Ice" can provide temperatures below -109.3o F. Ã higher than ordinary ice, for the following reasons: i) provides a much lower temperature of the ice. ii) lasts longer. Iii) It freezes faster. iv) Does not wet the cooled food, such as sublimates directly into the gaseous state. 4. The manufacture of fertilizers Carbon dioxide is widely used in the manufacture of urea, a major in the nitrogen fertilizer. 5 industry baking the baking powder is used in all food preparations. The addition of yeast in powder form during the cooking process produces carbon dioxide which makes the dough The small pores in a sandwich are the spaces where carbon dioxide has been formed. The yeast is also used in cooking instead of the cooking dust. Produces carbon dioxide for anaerobic breathing. The cooking dust contains starch, sodium hydrogen carbonate and an acid ingredient, such as the tartaric calcium hydrogen phosphate acid [CA (H2PO4) 2] or alum [NA2SO4.al2 (SO4) 3.24 H2O]. 6. In medicine a mixture of 97% oxygen and 3% carbon dioxide, called carbogen is used to revive affected people affected Carbon monoxide poisoning, pneumonia, asphyxia etc. 7. The manufacture of aerate drinks carbon dioxide is widely used in aerated drinks. Increasing pressure increases gas solubility. Fizz in the beverage is due to carbon dioxide released when the pressure is reduced. 8. Food storage is used to fill silos (storage boxes) and containers, which are used to store food cereals. After the silos are packed with food cereals, carbon dioxide is pumped in silos from above. The gas is heavier, then the air falls slowly, pushing the air between the grains. This prevents the growth of bacteria, mushrooms, etc. on cereals. 9. In the entertainment sector, dry ice is used to create artificial clouds as special effects, for theatrical performances, movies, discos etc. The dry ice is thrown into the water; By absorbing the heat from the water, sublimal solid carbon dioxide, bringing a lot of water vapor with itself. These two together form white "Clouds". But unlike real clouds, which are formed above due to the low density of water vapor steam, the artificial cloud fills the floor of the phase, as the density of carbon dioxide vapor is 22. So, while the lower part The artist's body is covered by 'Cloud', the upper half is visible. Carbon (II) oxide (carbon monoxide): carbon monoxide is an odorless gas, without taste and colorless, insoluble in water. It is extremely poisonous. Under no circumstances must the gas be inhaled or scented. Usually it is not prepared in a school lab. If necessary, the gas should be prepared in a steam room. Preparation of carbon monoxide 1. Oxalic acid dehydration with hot concentrated sulfuric acid Carbon monoxide is prepared with the help of oxalic acid and concentrated sulfuric acid as shown below. Oxalic acid has the formula. Sulfuric acid reacts with oxalic acid and removes a water molecule (both hydrogen atoms, along with an oxygen atom). The product left behind due to this reaction, is a carbon dioxide molecule and a carbon monoxide molecule. Carbonic anhydride can be removed by passing through a concentrated potassium hydroxide solution. 2. Preparation of carbon monoxide dehydrating forming acid The formic acid has the HCOH formula. The formic acid can also be dehydrated in a similar way from hot concentrated sulfuric acid. Sulfuric acid removes two hydrogen atoms and an oxygen atom as a water molecule from it, and leaves behind a carbon monoxide molecule. Carbon monoxide is produced when organic matter is burned in a limited quantity of oxygen. For this reason, it is found in the exhaust gases of motor vehicles, as well as in cigarette smoke. Internal chimneys can be a serious danger if ventilation is scarce. Industrial preparation is industrially prepared (mixed with hydrogen) passing steam over coke at temperatures greater than 900 Â ° C. The resulting gas mixture is known as water gas, and is used as a fuel: Chemical Property of carbon monoxide a) The natural carbon monoxide is a neutral oxide. It is neither acid nor © © basic. b) stability is very stable and can not be decomposed by heat. c) Combustibility E 'a combustible gas. It burns well in air or oxygen to form carbon dioxide. The formation of carbon dioxide is tested by passing through a lime water solution. However, it is not a supporter of combustion, d) Reducing the carbon monoxide property is a powerful reducing agent. When the CO is passed over the heated metal oxides, it removes the oxygen to form dioxide and reduces oxides to their respective metals. Sodium carbonate and sodium sodium carbonate (na2co3) popularly known as sodium or sodium ash, sodium carbonate is a commercially important compound. in previous days, it was obtained from the ashes of plants and natural deposits in india and egitto. manufacture of sodium chloride sodium carbonate raw materials - nacl (chloride solution) ammonia - nh3 nh3- CaCO3 (for carbon dioxide supply) Main reaction process The first step in sodium carbonate production is to generate carbon dioxide. This can be obtained by heating limestone. The plant used in the process saturation of Brine Solvay with the solution of Ammonia Brine is pumped into the absorbent ammonia. From the ammonia recovery tower, ammonia mixed with a small carbon dioxide enters the absorbent and saturated the brine. Calcium and magnesium impurities present in brine are precipitated as carbonates. These impurities can be removed by pumping the liquid through the filter press and then passed through cooling tubes. The ammonia brine then enters the carbonization tower from above. This tower is partition with horizontal plates that have a central hole and covered with a perforated plate. The ammoniated brine meets the increasing flow of carbon dioxide to form crystals of sodium bicarbonate and ammonium chloride, which remains in the solution. Filtration The milky liquid viscous from the carbonization tower is filtered using a rotating vacuum filter. Solid sodium bicarbonate left on the filter cloth can be periodically scraped. The filter is pumped at the top of the ammonia recovery tower. Sodium bicarbonate is then heated strongly to form anidro sodium carbonate or sodium ash. Retristallation To obtain soda washing (Na2CO3.10H2O) from soda ash, ahydrous sodium carbonate is dissolved in water and re-crystallized. NaO2CO3 + 10H2O -> NaO2CO3.10H2O (Shuttle Company) Solvay process economy Calcium oxide or rapid lime formed in lime furnace has changed to sledged lime [Ca(OH)2] and pumped into ammonia recovery tower. This then reacts with the filtered by step 3 (filtration) to regenerate ammonia. Since ammonia is very expensive, this recycling reduces the purchase costs of fresh ammonia every time. Soda cleansing properties transparent crystalline solid with ten water molecules Soluble in water Washing soda solution is alkaline due to hydrolysis It has cleaner or cleaner properties Efflorescence less corrosive efflorescent is the loss of crystallization water from a hydrated salt, when exposed to the air. Use sodium carbonate as a laundry detergent as a detergent to soften hard water in glass, paper, soap and caustic soda production as a valuable laboratory reagent in quantitative analysis to standardize acid solutions in qualitative analysis in the detection of insoluble salt acid radicals Carbon cycle The cyclic changes that carbon undergoes in nature are indicated as a carbon cycle. Carbon in the form of carbon dioxide is added to the air and is removed from the air constantly. This addition and subtraction is so well balanced that the percentage of carbon dioxide remains considerable constant at 0.03 to 0.04 Addition of carbon dioxide to air 1. With the breathing of living organisms. 2. With carbon combustion present in carbon compounds, such as wood, coal, coke, oil, vegetable oil, alcohol etc. 3. From the decay of organic matter, like dead bodies of animals and plants. 4. From the chemical industry such as, limestone heating, molasse fermentation to form alcohol, in the production processes of beer and wine, etc. Removal of carbon dioxide from air 1. For photosynthesis Green plants take carbon dioxide to synthesize carbohydrates. Carbohydrates are consumed by animals, digested, absorbed and used in breathing. During breathing, carbohydrates are oxidized to carbon dioxide, which is released in the air. 2.Dissolving the carbon dioxide of the air dissolves into the water, forming a very diluted solution of carbonic acid. This reaction is unstable and depends on the water temperature. If the water becomes hotter, a little dissolved carbon dioxide is released into the air. Answers Firm of the Atom (III) 2, 8; 7; 2. (a) (i) 35 protons (twice;) 44 neutrons; 46 neutrons; (iii) each isotope 50;% 50;% (a) 17 17 18 17 17 20 (b) (i) (0.75 Ã- 37) + (0.25 Ã- 35) = 35.5 ;; (ii) 71; 4. (a) negligible / (approximately); [not zero] 0; 1; +1; (b) chlorine; 17 electrons; (ii) 17 5. (a) Q (b) has a smaller radius, so the attraction of electrons to the core is stronger. Or he has fewer shells so few screening of external electrons from the core, strongest attraction for the nucleus. Evaluation 2 1. (a) An explanation to include two from: 1. All elements react with sodium in the same way (form similar compounds); 2. Form colored halide / compounds with silver; 3. All silver halides / insoluble compounds in water; 4. All silver halides affected by light; 2. (a) (i) 37 (ii) 1; (iii) cesium / f rancium (iv) noble gas; non-reactive element; (b) 2cs + cl2 Â¨, Â® 2cscl formula CSCL; balancing; 3. (a) a description to include three from: Â ¢ â,¬ Â ¢ fizzi / bubbles; Â ¢ â,¬ Â ¢ moves; Â ¢ â,¬ Â ¢ floats on the water; Â ¢ â,¬ Â ¢ white smoke; Â ¢ â,¬ Â ¢ burns with the yellow flame; Â ¢ â,¬ Â ¢ dissolve / becomes smaller; Plus 1 Communication mark to present relevant information in a form suitable for its purpose; (b) hydrogen; (c) alkaline; (d) increases; 4. (a) (s); (I; (iii) p / q; (iv) p / q; (v) r / s / t; 5. (a) (i) any group 0 gas; (ii) lights up color / inert; (b) the boiling point increases as the atomic number increases; (c) (i) atoms of the same element with) different number of neutrons; (ii) a calculation to include :; = 20.18 / 20.2; (iii) an explanation to include: 1. complete / complete external shell; 2. Atoms do not share / forgive / earn the assessment of electrons 3 1. (a) both (forms of) covalent carbon / giant; (b) one Explanation to include: 1. Different arrangement; 2. Carbon atoms; [accepts appropriate relevant statements for 1 brand each] (c) an explanation to include two from: Diamond 1. All the electrons involved in the bond / four links for atom ; 2. No delocalized / reserve electrons; Graphite 1. Three bonds for atom; 2. Delocalized / reserve electrons; (b) get the second sign, it is necessary to mention CL the electrons] (d) c / i + O2 (g) -> CO2 (g) correct LHS; Correct RHS; 3 state symbols; 2. (a) (i) 4 electrons / same number of electron in outer shell; (ii) a suggestion to be included: Â ¢ â,¬ carbon and silicon both in group 4 / same group / same number of electron in outer shell; Â ¢ â,¬ Â ¢ The compounds of elements in the same group have similar properties; o Â ¢ â,¬ Â ¢ both covalent glued; Â ¢ â,¬ Â ¢ The declared property is similar; (b) binding - covalente; Reason: between non-metallic elements / both electrical / unlikely insulators to earn / lose four electrons; (ii) structure - giant structure / (lattice); [REJECT MACROMOLECULATION] Reason: High melting point; (iii) a description to include: Â ¢ â,¬ Â ¢ molecules held together; Â ¢ â,¬ Â ¢ in regular scheme / lattice; 3. (a) (i) shared couple in HCL; fully correct; [Deduct 1 sign for incorrect internal electrons] (ii) weak forces between molecules; (b) (i) 8 electrons; [No sign if incorrect internal electrons] (ii) 2h + + 2E- Â¨, Â¾", H2 formulas of H + and H2; fully correct; [Allow H + + H--> H for 1 brand] 4. (a) 3 (b) an electron on each hydrogen atom; Six external electrons on the oxygen atom; Both shared pairs shown; (c) covalente (i); (ii) shared pair identified; 5. (a) electron (s); (ii) chloride; (iii) strong / high; (B) shared; (Pair of) electrons; Reject other particles for the second sign (c) (i) covalent (bond); (Between) non-metals (atoms); [It must clearly involve both] (II) 35.5; Rating 4 1. (a) (i) to neutralize all the acid; (ii) zinc oxide / hydroxide; (B) (i) AG + (AQ) + CL (AQ) A, Â¾Â Â © AGCL; formulas; status symbols; (Ii) an explanation to include: 1. silver chloride 2. No indoluble silver acid reaction / carbonate; 2. (a) use safety glasses / wear apron / hair tie; o Avoid contact with lead / acid compounds (b) (i) acid c / sulphuric; (ii) Measurement diagram of the cylinder / pipette / Burette; label; 3. (a) b d to c and ;; (b) (i) measuring cylinder / bury / pipette; (ii) wear glasses / gloves; (c) precipitated; (d) filter funnel; Filter paper; (e) placed in hot position E.G. oven, radiator etc; 4. (i) chlorine; [Reject chloride] (ii) cl; [Refuse CL / CL2] (b) (i) 1 / alkaline metals; (ii) 1 / alkaline metals; (iii) both (compounds of) groups 1 / metals alkalini / (metals) in the same group; (c) solid disappears / dissolve / (colorless) solution formed; KCSE Revision Notes Form 1 - Form 4 All Subjects Form Agriculture 1 Notes Form Agriculture 2 Notes Form Agriculture Shape 3 Notes Agriculture Form 4 Notes Agriculture Notes Agriculture Primary processing Tradition in city by Francis Form diagrams of biology and images Biology Biology Notes Module 1 Biology Notes Form 2 Biology Notes Form 3 Biology Notes Form 4 Biology Questions and answers form a biology Questions and answers Biology Form two questions and biology answers Module four business studies Notes KCSE Form 1 - 4 | Business Notes for Secondary Schools in Kenya Chemistry Notes - Acid, Bases And Chemical Notes Indicators - Acid, Bases And Chemical Notes Module 1 Chemical Notes Shape 2 Chemical Notes Shape 3 Shape Computer Notes Form 1 Computer Studies Notes Module 2 Studies for Computer Notes Form 3 Computer Studies Notes Form 4 Cre Notes - Christian Religious Education Revision Cre NOTES - Christian Religious Education Questions and Answers CREMO NOTES Form 1 CRE Notes Form 2 CRE Notes Form 3 CRE Notes Form 4 CRE Notes Form 1 - 4 English notes grammamar composition idea history and government notes modum 1 to form 4 history and government Questions and answers Questions and answers Home Science Form 1 Notes Home Science Form 2 Notes Home Science Form 3 Notes Home Science Form 4 Notes How to review in Efficient Fashion for KCSE Exams Geography Notes Shape 1 Geography Notes Form 2 Geography Notes Shape 3 Geography Notes Form 4 Physical Notes Module 1 Physical Notes Module 2 Physical Notes Module The 3 Physics Notes form 4 Physical Notes Module 1 to 4 The river and the source Other Biology Notes - Biology Study Guide Questions and Answers PDF Basic Chemical Questions and Answers Basic Chemical Questions and Answers Questions and PDF Answers Chemical Module 1 Notes Chemical Form 1 Notes PDF Chemical Module PDF 1 Notes PDF Download Chemical Module 2 Notes Chemical Module 2 Questions and Answers Chemical Form 2 Salts Chemical Module 2 Structure and Bonding Chemical Module 3 Notes Form of Chemistry 3 Notes Chemical Module PDF Chemical Shape 4 Notes Chemical Form 4 Notes Chapter 1 Chemical Form 4 Notes Chapter 2 Chemical Module 4 Notes Chapter 3 Chemical Shape 4 Notes Download Chemical Shape 4 Notes PDF Chemistry Form One Book PDF Chemistry form one notes pdf chemistry form one pdf chemical questions and answers pdf chemistry objective questions for competitive exams demand for chemistry and response with chemistry and answers of Explanation chemistry RY Questions and answers for questions and answers of high school chemistry Questions and answers PDF For questions and answers of class chemistry 12 Questions and answers for questions and answers of class chemistry 12 Questions and answers Choose of chemistry Download Download the shape of the chemistry 2 Notes Download the shape of the chemistry KLB Book 3 3 Chemical questions and answers Form 3 Questions and answers Chemical questions and answers Questions and answers PDF Inorganic Chemistry Multiple choice questions With answers PDF Chemistor Inorganic Questions and Answers PDF Interesting Chemical Questions KLB Chemistry Book 1 Download KLB Chemistry Book 1 PDF KLB Chemistry Book 2 Notes KLB Chemistry Book 2 Notes PDF KLB Chemistry Book 3 Notes KLB Chemical form 2 Notes KLB Chemical Module 2 PDF KLB Chemical Form 2 PDF SPM Home Chemistry Notes Tricky Chemistry Questions with answers T ricky