Nitrogen family elements

The elements of Group 15 are also referred to as nitrogen flocks, including nitrogen phosphorus, arsenic, antimony and bismuth elements. Block P elements are also known as representative elements on the right side of the main periodic table. The modern periodic table, as conceived by Dimitri Mendeleev, organizes all the elements known to man based on its atomic number, which is unique to each element. The results of such an agreement were a periodic table. Elements with similar properties were sorted in a column called a group. Periodic trends in group 15 elements So in group 15 elements, how you could move down into a group, from the lightest element to the heavy; You notice a general flow of properties as you move down in sequence. For example, nitrogen is gas and non-metal, but as you move down the group, we face metalloids and then the bottom of the metal, i.e. Bismuth. These trends in the periodic table help us to better understand the behaviour of atoms, as well as help us anticipate new elements. Property Nitrogen Phosphorus Arsenic Antimony Bismuth Atomic symbol N P As Sb Bi Atomic number 7 15 33 51 83 Atomic mass (amu) 14.01 30.97 74.92 121.76 209.98 Valence electron configuration [He]2s2 2p3 [Ne]3s2 3p3 [Ar]3d10 4s24p3 [Kr]4d10 5s25p3 [Xe]4f14 5d106s26p3 Melting point Boiling point (°C) – 210 -196 44.15 281 817 603(sublimes) 631 1587 271 1564 Density (g/cm3) at 25°C 1.15(g/L) 1.8 5.7 6.68 9.79 Atomic radius (pm) 56 98 114 133 143 First Ionization energy (kJ/mol) 1402 1012 947 834 703 Common Oxidation state(s) -3 to +5 +5, +3, -3 +5, +3 +5, +3 +3 Ionic radius (pm) 146(-3) 212(-3) 58(+3) 76(+3) 103(+3) Electronegativity 3.0 2.2 2.2 2.1 1.9 Some of the trends in the modern periodic table with respect to group 15 elements of the p-Block elements are discussed below. 1. Electronic configuration valence shell electronic configuration plays a major role in how the element behaves. The valence electron housing configuration of the group 15 elements shall be ns2np3. All 15 elements of the group have the same agreement and are therefore similar. This group's s-orbit is completely filled, and the p-orbits are half-filled, and this makes their configuration particularly stable. 2. Atomic and ion radii If you see the electronic configuration of the elements in the table above, you will notice that with each step you move down, new orbits are added to the atom. This new orbital supplement increases both atomic and ion radii for a group of 15 elements. However, we can see that only a slight increase in the ion radius is observed from Arsenic to Bismuth. This is due to the presence of completely filled d and/or f orbit heavier limbs. 3. Ionization Enthalpy Ionization Energy is the amount of energy needed to remove an electron from the outermost orbital atom. This is essentially the core cun to the electron. The closer the electron is to the core, the stronger its hold, and thus the energy needed is greater. As we move down the group, the radius of the atom increases, and therefore the ionization energy decreases due to weaker kernel loads. 4. Electronegativity The value of electrical negativity decreases in the group as the atomic size increases. This is again due to the increasing distance between the nucleus and the valence sheath as we move down the group. 5. Physical properties All elements of the group exist in a polyatomic state. First, Nitrogen is gas, but as you move down there is a significant increase in metal character elements. Nitrogen and phosphorus are non-metals, arsenic and antimony are metalloids, and bismuth is metal. These changes can be attributed to the decrease in ionization of enthalpy and increase atomic size. Boiling points also generally indicate an increasing trend as you move down. With the exception of nitrogen, all other elements have allotropes. 6. The chemical properties of P-Block element valence shells are ns2 np3 configuration. Thus, the elements here can either lose 5 electrons or get 3. With the decline of ionization entalgia and electronegativity, due to the increasing atomic radius, the tendency to get three electrons to form -3 oxidation state decreases down the group. In fact, Bismuth hardly forms any compound with a -3 oxidation state. As we go down, the stability of state 5 decreases, and that 3 increases due to the inert cross effect. There is so much to know and explore. Know it all and explore it all with the best education firm in India, BYJU's. Nitrogen family includes the following compounds: nitrogen (N), phosphorus (P), arsenic (As), antimony (Sb) and bismuth (Bi). All 15 elements of the group are electron configuration ns2np3 in their outer casing, where n is the main quantum number. Group 15: General properties and reactions Nitrogen family includes the following compounds: nitrogen (N), phosphorus (P), arsenic (As), antimony (Sb), and bismuth (Bi). All 15 elements of the group are electron configuration ns2np3 in their outer casing, where n is equal to the main quantum number. The nitrogen family shall be located in the p-block in group 15 as shown below. Nitrogen group (group 5) Nitrogen chemistry (Z=7)Nitrogen is present in almost all proteins and plays an important role in both biochemical applications and industrial applications. Nitrogen forms strong bonds because of its ability to form a triple bond with itself and other elements. Thus, nitrogen compounds a lot of energy. 100 years ago, little was known about nitrogen. Now, nitrogen is commonly used to conserve food, and as fertilizer. Chemistry Phosphorus (Z=15)Phosphorus (P) is an essential part of life, as we know it. Without phosphates in biological molecules such as ATP, ADP and DNA, we would not be alive. Phosphorus compounds can also be found in minerals in our bones and teeth. This is a necessary part of our diet. In fact, we consume it in almost all the foods we eat. Phosphorus is quite reactive. The quality of this element makes it an ideal component for matches because it is so combustible. Arsenic chemistry (Z=33)Arsenic is in 33rd place in the periodic table, right next to the germanium and selenium. Arsenic has been known for a very long time, and the person who may be first isolated it is unknown, but credit is usually given to Albertus Magnus for about a year 1250. The element, which is classified as metalloid, is named after the Latin arsenicum and Greek arsenikon, both of which are names of pigment, yellow orpiment. Antimony chemistry (Z=51)Antimony and its compounds have been known for centuries. Scientific research on the element began in the early 17th century, much of the most important works carried out by Nicolas Lemery. The element's name comes from the Greek anti + monos on not only, but the modern symbol is rooted in the Latin origin of the name of the common horde, stibnite. Bismuth chemistry (Z=83)Bismuth, the heaviest non-active element in nature, was isolated by Basil Valentine in 1450. It is a solid, brittle metal with an unusually low melting point (271oC). Bimuta alloys with other metals with low melting levels, such as tin and lead, have even lower melting points and are used for electric soldering strips, fuse elements and automatic fire sprinkler heads. Moskovium chemistry (Z=115)Four atoms of 113 13 were produced in the studies jointly announceded by the Joint Nuclear Research Institute in Dubna, Russia, and lawrence livermore National Laboratory in the USA, mocking element 115 after the confluence of Ca-48 and Am-243. Thumbnail: White and red phosphorus. (CC-SA-BY 3.0; Peter Krimbacher. Group 15 (VA) contains nitrogen, phosphorus, arsenic, antimony and bismuth. The elements in group 15 are five valence electrons. Because cells can either get three electrons or lose five to get a stable configuration, they more often form a covalent compound as long as associated with active metals. Their electron creatures are not very large. Metal properties increase significantly from gaseous nitrogen to barely metallic bismuth with increasing size and mass. Nitrogen and phosphorus are non-metal and arsenic and antimony are metaloids. The elements of this group are known as pnicotins and their compounds as pniconides. The name is derived from the Greek word pnicomigs meaning suffocation. These elements are much less reactive than those in Group 16 and their chemistry is more complex. Most Of the following elements are in the oxidation state of +3 or +5, although they form gaseous compounds with hydrogen -3 in the oxidation state: ammoniax NH3, phosphine PH3, arsine AsH3, stibbin AsH3 and bismuthine BiH3; they all burn oxygen to give oxides or free cells (in the case of nitrogen). 4 NH 3 + 3 O 2 → 6 H 2 O + 2 N 2 (\displaystyle 4 {\hbox{NH}}_{3}+3{\hbox{O}}_{2} {3} < 5>\to 6{\hbox{H}}_{2}{\hbox{O}}+2{\hbox{N}}_{2}} All shape oxides - nitrogen with difficulty, others with ease. Most oxides are acidic, except for nitric oxide N2O, nitric oxide NO and bismuth oxide Bi2O3. With the exception of nitrogen, typical oxides are +3 or +5 (excluding bismuth) in oxidation countries. All forms of halogenides-nitrogen with difficulty, but phosphorus, arsenic and antimony are completely hydrolyzed in water. Nitrogen and phosphorus form important acids +5 in the oxidation state. Nitric acid HNO3, a substance used to create drugs and explosives (but this acid is corrosive and dangerous, so don't touch it or even leak it into something), and salts known as nitrates, such as potassium nitrate KNO3, an important fertilizer. Phosphorus forms phosphoric acid, H3PO4; phosphates are salts of phosphoric acid. Some phosphates are essential for breathing and thus for life itself. Nitrogen flocks in general covalency are 3. Nitrogen shows how nitrogen is passed along organisms and the atmosphere. Nitrogen is naturally present as diatomaceous gas N2. This accounts for about 78% of the air we breathe. The bond, which holds two nitrogen atoms together, is a triple covalent, so it is very strong. In this context, nitrogen is very unresponsive. It is used in many places when inert gas is required. However, nitrogen will react with some substances: 6 Li (s) + N 2 (g) → 2 Li 3 N (s) {\displaystyle 6{\hbox{Li}}}_{(s)}+{{hbox{N}_{2(g)}\to 2{\h{Li}_{3}{\hbox{N}_{{{(s)}}3 Mg (s) + N 2 (g) → Mg 3 N 2 (s) {\displaystyle 3{\hbox{Mg}}_{(s)}+{hbox{N}}_{2(g)}\to {\hbox{Mg}}_{3}{\hbox{N}}_{2(s)}} Although gas is generally considered inert (inert) , it reacts with some elements by burning. Li 3 N(s) + 3 H 2 O → 3 LiOH (q) + NH 3 (g) {\displaystyle {\hbox{Li}}_{3}{\hbox{N}}_{(s)}++) 3{\hbox{H}}_{2}{\hbox{O}}'to 3{\hbox{LiOH}}_{(aq)}+{hbox{NH}}_{3(g)}Mg 3 N 2 (s) + 6 H 2 O → 3 Mg (OH) 2 (q) + 2 NH 3 (g) {\displaystyle {\hbox{Mg}}_{3}{\hbox{N}}_{22(s)}+6{\hbox{H}}_{2}{\hbox{O}}'to 3{\hbox{Mg}}{(hbox{OH}}})_{2(aq)}+2{\ hbox{ NH}}_{3(g)}} Nitrides react strongly with water to form ammonia gas and a basic solution. In its pure form, nitrogen is not very useful and will suffocate any animal that breathes pure nitrogen. This is much more important if it is a component of ammonia, nitrate, oxide, or biomolecules such as protein. Since it is very unresponsive in nature, it is difficult to achieve nitrogen reacts and build these useful Any process that can convert elemental nitrogen into nitrogen is called nitrogen fixation. Nitrogen fixation is biologically important because amino acids, proteins and enzymes contain nitrogen. This is commercially important because it is used for explosives, rocket fuel, and fertilizers. There are many nitrogen fixation reactions: N 2 + 8 H + + 8 e − + e n e r g y → 2 NH 3 + H 2 (\displaystyle {\hbox{N}}_{2}+8{\hbox {H}}^+}+8{\hbox{e}^{-}+energy to 2{\hbox{NH}}_{3}+{\hbox{H}}_{2}} This occurs in bacterial enzymes. Ammonia (NH3) quickly becomes ammonium (NH4+). Bacteria nitrogen enters the soil where plants can absorb it. People and animals that eat these plants can get nitrogen into useful compounds. N 2 + 3 H 2 ↔ 2 NH 3 {\displaystyle {\hbox{N}}_{2}+3{\hbox{H}}_{2}\leftrightarrow 2{\hbox{NH}}_{3}} Haber process is used for commercial production of ammonia. This reaction occurs only at very high pressure and temperature (around 20 MPa and 500 °C) and in the presence of an iron catalyst. Also, the reaction occurs in slightly complex equipment, which is the input of clean reagents and extract ammonia. In the cold, dense, hydrogen-rich atmospheres of Jupiter, Saturn, Uranus and Neptune, nitrogen usually exists in combination with hydrogen as ammonia. Keep in mind that ammonia is gas at STP. A household product called ammonia is actually an aqueous solution of ammonium hydroxide (NH4OH) resulting from the dissolving of ammonia gas in water. Ammonia, on the contrary to hydrogen compounds in groups 16 and 17, is the basis for its reaction, forming salts with weak and strong acids alike. The substance such as ammonium chloride (NH4Cl) is a soluble, strongly ion salt. Nitrogen compounds are often extremely unstable because nitrogen atoms tend to look for each other to reunite as nitrogen gas. Many nitrogen compounds are literal explosives, including TNT and nitroglycerin. These explosives are common to construction projects for the demolition of buildings and other obstacles to new construction or access to minerals in mining activities. Phosphorus is the phosphorus nuclear structure Phosphorus has two common blinds: red phosphorus and white phosphorus. White phosphorus (P4) has a wax appearance and turns yellow for light. When exposed to oxygen in the dark, it shines pale green. . White phosphorus ignites in all but the most important conditions. White phosphorus combustion produces phosphorus(V) oxide: P 4 + 5 O 2 → P 4 O 10 {\displaystyle {\hbox{P}}_{4}+5{\hbox{O}}_{2}\to {\hbox{P}}_{4}{\hbox{O}}_{10}} One of its most common uses is military weapons that cause severe arson of a weapon hit by an object. Red phosphorus is amorphous solid. It is more stable and explodes at temperatures higher than white phosphorus. However, there is still Reactive. Both types of phosphorus are insoluble in water and can be interconverted by various uses of heat, pressure and light. There is also black phosphorus and violet phosphorus. Unlike nitrogen, phosphorus will not easily form a diatomaceous molecule with a triple bond. Diphosphorus exists, but only between the temperature ranges 1200 °C and 2000 °C. Phosphorus pentoxide reacts strongly with water to form phosphoric acid, a substance that removes rust from iron, especially on ships; it is often referred to as sea gel. But phosphoric acid is corrosive to the flesh and should not be touched. Phosphorus is essential for life in the form of phosphates in bones and substances called ADP and ATP, which converts food into useful energy in cells. Others[correct] crystal bismuth, showing their colorful iridescent tarnish. Arsenic is similar to phosphorus. It has three allotropes: gray arsenic, yellow arsenic, and black arsenic. Grey arsenic is the most common form. Its structure is similar to graphite. Antimony has no physical properties of metal, but acts chemically as non-metallic. Bismuth is a brittle, silvery metal. The bismuth is actually radioactive, decaying into thallium-205. Since its half-life is 19 x 1018 years, about a million times the age of the universe, the bismuth is usually considered stable. Bismuth is much less radioactive than almost harmless and imminent radioactive isotopes in carbon and potassium living cases. Unlike arsenic and antimony, its compounds are not toxic unless something else in the compound itself is toxic or the substance is very acidic or alkaline. In fact, the bismuth compound is very often heavily used in gastric medicines that do not require a prescription. Prescription.