Electron configuration for sulfur

Sulfur Electron Configuration: Sulphur or sulfur is a chemical element. It has a chemical symbol S. The atomic number of Sulfur is 16. It is multivalent, abundant, and nonmetallic. Under normal situations, sulfur forms cyclic octatomic molecules that have a chemical formula S8. Sulfur Electron Configuration Elemental sulfur is a yellow bright crystalline solid at room temperature. Sulfur chemically reacts with all elements except for platinum, gold, tellurium, iridium, and the noble gases. It is the fifth most common element by mass on Earth and tenth in the universe. It is sometimes found in the pure and native form. Sulfur usually occurs as sulfate and sulfide minerals. As it is abundant in native form, sulfur was also known in ancient times. It was mentioned for its uses in ancient Greece, ancient India, Egypt and China. In the Bible, sulfur is known by the name of brimstone. Now all elemental sulfur is made as a byproduct of removing sulfur-containing contaminants from petroleum and natural gas. Today we are going to tell you about the electron configuration of Sulfur. What is The Electron Configuration of Sulfur How Many Valence Electrons Does Sulfur Have Sulfur has six valence electrons in the outer shell of the Sulfur. Sulfur Number of Valence Electrons There are six valence electrons in the outer shell of the Sulfur. Ground State Electron Configuration of Sulfur when we the electron configuration of Sulfur the first two electrons go in the 1s orbital. As 1s only hold two electrons and the next two electrons for sulfur goes to the 2s orbital. Hence the S electron configuration is 1s22s22p63s23p4.
10XX,52,11XX,17,12XX,7,13XX,4,15XX,16,3XXX,2,40XX,10,41XX,12,43XX,5,44XX,4,46XX,5,47XX,3,48XX,3,5XXX,23,6XXX,3,71XX,1,8XXX,22,92XX,5,93XX,1,94XX,4,98XX,2,AISI,66,ASTM,171,Atomic-Mass,327,Atomic-Number,436,Atomic-Radius,86,Atomic-Symbol,329,Atomic-Volume,94,Austenitic,56,Boiling-Point,94,bp1,97,CBS,6,Chemical-Elements,100,Chemical-Symbol,217,CMDS,13,Coefficient-of-Thermal-Expansion,85,Covalent-Radius,87,Crystal-Structure,109,CS,17,CVS,3,Density,297,Duplex,6,Elastic-Modulus,30,Electrical-Conductivity,79,Electro-Affinity,87,Electron-Configuration,109,Electronegativity,102,Electrons-per-Shell,111,Enthalpy-of-Fusion,93,Enthalpy-of-Vaporization,95,Ferritic,12,fp1,38,Group-Number,218,HCS,14,Heat-of-Fusion,87,Heat-of-Vaporization,85,HMCS,16,Ionic-Radius,78,Ionization-Energy,102,Ionization-Potential,101,LCS,21,List,281,Martensitic,6,MCS,17,MDS,14,Melting-Point,96,mm1,2,mp1,99,MS,4,NCMDBS,6,NCMDS,31,NCS,2,NMDS,8,Oxidation-States,104,p1,4,Period-Number,107,Properties,40,RCLS,1,RCS,16,ref1,3,RRCLS,3,RRCS,4,SAE,201,Site,2,SMS,5,Specific-Gravity,83,Specific-Heat,92,Specific-Weight,1,SS,80,Tests,2,Thermal-Conductivity,105,Valence-Electrons,98,wt1,16, The element Sulfur was discovered by Ancient china in year 500 BC in unknown place . Sulfur derived its name from the Latin word sulphur, 'fire and brimstone' Sulfur Presence: Abundance in Nature and Around Us The table below shows the abundance of Sulfur in Universe, Sun, Meteorites, Earth's Crust, Oceans and Human Body. Crystal Structure of Sulfur The solid state structure of Sulfur is Face Centered Orthorhombic. The Crystal structure can be described in terms of its unit Cell. The unit Cells repeats itself in three dimensional space to form the structure. Unit Cell Parameters The unit cell is represented in terms of its lattice parameters, which are the lengths of the cell edges Lattice Constants (a, b and c) a b c 1043.7 1284.5 2436.9 pm and the angles between them Lattice Angles (alpha, beta and gamma). alpha beta gamma π/2 π/2 π/2 The positions of the atoms inside the unit cell are described by the set of atomic positions (xi, yi, zi) measured from a reference lattice point. The symmetry properties of the crystal are described by the concept of space groups. All possible symmetric arrangements of particles in three-dimensional space are described by the 230 space groups (219 distinct types, or 230 if chiral copies are considered distinct. Sulfur Atomic and Orbital Properties Sulfur atoms have 16 electrons and the electronic shell structure is [2, 8, 6] with Atomic Term Symbol (Quantum Numbers) 3P2. Shell Structure of Sulfur - Electrons per energy level n s p d f 1 K 2 2 L 2 6 3 M 2 4 Ground State Electronic Configuration of Sulfur - neutral Sulfur atom The ground state electronic configuration of Neutral Sulfur atom is [Ne] 3s2 3p4. The portion of Sulfur configuration that is equivalent to the noble gas of the preceding period, is abbreviated as [Ne]. For atoms with many electrons, this notation can become lengthy and so an abbreviated notation is used.This is important as it is the Valence electrons 3s2 3p4, electrons in the outermost shell that determine the chemical properties of the element. Unabbreviated electronic configuration of neutral Sulfur Complete ground state electronic configuration for the Sulfur atom, Unabbreviated electronic configuration 1s2 2s2 2p6 3s2 3p4 Atomic Structure of Sulfur Sulfur atomic radius is 88 pm, while it's covalent radius is 102 pm. Atomic Spectrum of Sulfur Sulfur Chemical Properties: Sulfur Ionization Energies and electron affinity The electron affinity of Sulfur is 200 kJ/mol Valence 6 Electronegativity 2.58 ElectronAffinity 200 kJ/mol Ionization Energy of Sulfur Refer to table below for Ionization energies of Sulfur Ionization energy number Enthalpy - kJ/mol 1 999.6 2 2252 3 3357 4 4556 5 7004.3 6 8495.8 7 27107 8 31719 9 36621 10 43177 Sulfur Physical Properties Refer to below table for Sulfur Physical Properties Density 1.96 g/cm3 Molar Volume 16.3596938776 cm3 Elastic Properties Young Modulus N/A Shear Modulus N/A Bulk Modulus 7.7 GPa Poisson Ratio N/A Hardness of Sulfur - Tests to Measure of Hardness of Element Mohs Hardness 2 MPa Vickers Hardness N/A Brinell Hardness N/A Sulfur Electrical Properties Sulfur is Insulator of electricity. Refer to table below for the Electrical properties of Sulfur Sulfur Heat and Conduction Properties Thermal Conductivity 0.205 W/(m K) Thermal Expansion N/A Sulfur Magnetic Properties Optical Properties of Sulfur Refractive Index 1.001111 Acoustic Properties of Sulfur Sulfur Thermal Properties - Enthalpies and thermodynamics Refer to table below for Thermal properties of Sulfur Enthalpies of Sulfur Sulfur Isotopes - Nuclear Properties of Sulfur Isotopes of rhodium. Naturally occurring Sulfur has 4 stable isotope - 32S, 33S, 34S, 36S. Isotope Isotope Mass % Abundance T half Decay Mode 26S 27S 28S 29S 30S 31S 32S 94.93% Stable N/A 33S 0.76% Stable N/A 34S 4.29% Stable N/A 35S 36S 0.02% Stable N/A 37S 38S 39S 40S 41S 42S 43S 44S 45S 46S 47S 48S 49S Regulatory and Health - Health and Safety Parameters and Guidelines CAS Number CAS7704-34-9 RTECS Number {RTECSWS4250000, N/A, N/A, N/A, N/A, N/A} DOT Hazard Class {N/A, N/A, N/A, N/A, N/A, N/A} DOT Numbers "N/A", "N/A", "N/A", "N/A", "N/A", "N/A" EU Number {N/A, N/A, N/A, N/A, N/A, N/A} NFPA Fire Rating {N/A, N/A, N/A, N/A, N/A, N/A} NFPA Hazards N/ A, N/ A, N/ A, N/ A, N/ A, N/ A NFPA Health Rating {N/A, N/A, N/A, N/A, N/A, N/A} NFPA Reactivity Rating {N/A, N/A, N/A, N/A, N/A, N/A} Autoignition Point N/A Flashpoint N/A Database Search List of unique identifiers to search the element in various chemical registry databases Database Identifier number CAS Number - Chemical Abstracts Service (CAS) CAS7704-34-9 CID Number {CID5362487, CID5460602, CID139340, CID139602, CID66348, CID66348} Gmelin Number {N/A, N/A, N/A, N/A, N/A, N/A} NSC Number {N/A, N/A, N/A, N/A, N/A, N/A} RTECS Number {RTECSWS4250000, N/A, N/A, N/A, N/A, N/A} Explore our interactive periodic table Periodic Table Element Comparison Something went wrong. Wait a moment and try again. Learning Objective Draw, interpret, and convert between Lewis (Kekule), Condensed, and Bond-line Structures Note: The review of general chemistry in sections 1.3 - 1.6 is integrated into the above Learning Objective for organic chemistry in sections 1.7 and 1.8. The electron configuration of an atom is the representation of the arrangement of electrons distributed among the orbital shells and subshells. Commonly, the electron configuration is used to describe the orbitals of an atom in its ground state, but it can also be used to represent an atom that has ionized into a cation or anion by compensating with the loss of or gain of electrons in their subsequent orbitals. Many of the physical and chemical properties of elements can be correlated to their unique electron configurations. The valence electrons, electrons in the outermost shell, are the determining factor for the unique chemistry of the element. Before assigning the electrons of an atom into orbitals, one must become familiar with the basic concepts of electron configurations. Every element on the Periodic Table consists of atoms, which are composed of protons, neutrons, and electrons. Electrons exhibit a negative charge and are found around the nucleus of the atom in electron orbitals, defined as the volume of space in which the electron can be found within 95% probability. The four different types of orbitals (s,p,d, and f) have different shapes, and one orbital can hold a maximum of two electrons. The p, d, and f orbitals have different sublevels, thus can hold more electrons. As stated, the electron configuration of each element is unique to its position on the periodic table. The energy level is determined by the period and the number of electrons is given by the atomic number of the element. Orbitals on different energy levels are similar to each other, but they occupy different areas in space. The 1s orbital and 2s orbital both have the characteristics of an s orbital (radial nodes, spherical volume probabilities, can only hold two electrons, etc.) but, as they are found in different energy levels, they occupy different spaces around the nucleus. Each orbital can be represented by specific blocks on the periodic table. The s-block is the region of the alkali metals including helium (Groups 1 & 2), the d-block are the transition metals (Groups 3 to 12), the p-block are the main group elements from Groups 13 to 18, and the f-block are the lanthanides and actinides series. Using the periodic table to determine the electron configurations of atoms is key, but also keep in mind that there are certain rules to follow when assigning electrons to different orbitals. The periodic table is an incredibly helpful tool in writing electron configurations. For more information on how electron configurations and the periodic table are linked, visit the Connecting Electrons to the Periodic Table module. Electrons fill orbitals in a way to minimize the energy of the atom. Therefore, the electrons in an atom fill the principal energy levels in order of increasing energy (the electrons are getting farther from the nucleus). The order of levels filled looks like this: 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d, and 7p One way to remember this pattern, probably the easiest, is to refer to the periodic table and remember where each orbital block falls to logically deduce this pattern. Another way is to make a table like the one below and use vertical lines to determine which subshells correspond with each other. The Pauli exclusion principle states that no two electrons can have the same four quantum numbers. The first three (n, l, and ml) may be the same, but the fourth quantum number must be different. A single orbital can hold a maximum of two electrons, which must have opposing spins; otherwise they would have the same four quantum numbers, which is forbidden. One electron is spin up (ms = +1/2) and the other would spin down (ms = -1/2). This tells us that each subshell has double the electrons per orbital. The s subshell has 1 orbital that can hold up to 2 electrons, the p subshell has 3 orbitals that can hold up to 6 electrons, the d subshell has 5 orbitals that hold up to 10 electrons, and the f subshell has 7 orbitals with 14 electrons. Example 1: Hydrogen and Helium The first three quantum numbers of an electron are n=1, l=0, ml=0. Only two electrons can correspond to these, which would be either ms = -1/2 or ms = +1/2. As we already know from our studies of quantum numbers and electron orbitals, we can conclude that these four quantum numbers refer to the 1s subshell. If only one of the ms values are given then we would have 1s1 (denoting hydrogen) if both are given we would have 1s2 (denoting helium). Visually, this is be represented as: As shown, the 1s subshell can hold only two electrons and, when filled, the electrons have opposite spins. When assigning electrons in orbitals, each electron will first fill all the orbitals with similar energy (also referred to as degenerate) before pairing with another electron in a half-filled orbital. Atoms at ground states tend to have as many unpaired electrons as possible. When visualizing this processes, think about how electrons are exhibiting the same behavior as the same poles on a magnet would if they came into contact; as the negatively charged electrons fill orbitals they first try to get as far as possible from each other before having to pair up. Example 2: Oxygen and Nitrogen If we look at the correct electron configuration of the Nitrogen (Z = 7) atom, a very important element in the biology of plants: 1s2 2s2 2p3 We can clearly see that p orbitals are half-filled as there are three electrons and three p orbitals. This is because Hund's Rule states that the three electrons in the 2p subshell will fill all the empty orbitals first before filling orbitals with electrons in them. If we look at the element after Nitrogen in the same period, Oxygen (Z = 8) its electron configuration is: 1s2 2s2 2p4 (for an atom). Oxygen has one more electron than Nitrogen and as the orbitals are all half filled the electron must pair up. Aufbau comes from the German word "aufbauen" meaning "to build." When writing electron configurations, orbitals are built up from atom to atom. When writing the electron configuration for an atom, orbitals are filled in order of increasing atomic number. However, there are some exceptions to this rule. Example 3: 3rd row elements Following the pattern across a period from B (Z=5) to Ne (Z=10), the number of electrons increases and the subshells are filled. This example focuses on the p subshell, which fills from boron to neon. B (Z=5) configuration: 1s2 2s2 2p1 C (Z=6) configuration:1s2 2s2 2p2 N (Z=7) configuration:1s2 2s2 2p3 O (Z=8) configuration:1s2 2s2 2p4 F (Z=9) configuration:1s2 2s2 2p5 Ne (Z=10) configuration:1s2 2s2 2p6 The electron configuration for sulfur is 1s2 2s2 2p6 3s2 3p4 and can be represented using the orbital diagram below. Write the electron configuration for phosphorus and draw the orbital diagram. Solution: The electron configuration for phosphorus is 1s2 2s2 2p6 3s2 3p3 and the orbital diagram is drawn below.

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