P sublevel valence electrons

Periodic table In the previous section, the periodic table was presented as a list of items. We also noted that the design of the periodic table separates metals from non-metals. In this section, we'll show how the different features of the table relate to the configuration of the electrons of the different elements and their position in the table. First of all, let's point to these features using the full periodic table shown in figure 5.10. In the table, the items are placed in rows and columns of varying lengths. Seven lines are used to display all the items currently known. These lines are called periods, and each period is umenable. Note that the display of items marked as lantanids and placed below the table refers to period 6 between element 57 (lantanum) and element 72 (hafni). In some periodic tables, the lantanum is the first member of the lantanide series. Similarly, the actinide-labeled display refers to period 7 between element 89 (actinium) and element 104 (ruterium). Again, in some tables actinium is the first member of the actinide series. These two displays are usually placed under the table, so that the table will fit into a reasonable space. The columns of the periodic table vary in length. Some of them are measured. Short columns, those in the middle of the table, were not moderated. FIGURE 5.10 Periodic Table of Elements. The elements in the column make up a family of items. The family is also known as the group. Thus, the elements in column 8 are known as a family or a group of noble gases. A. The configuration of the electrons and the periodic table Figure 5.11 again shows the periodic table, but without the symbols of the elements. Instead, it shows the latest gravy filled in the description of the electron elements configurations in each section. We will use figure 5.11 and figure 5.8 to link the configuration of the element's electron to its position in the periodic table. FIGURE 5.11 Periodic table and energy level squisets. FIGURE 5.8 The main energy levels of the atom and sub-field and orbital stations contain each of them. The arrows show the order of filling the underers. In period 1, there are two boxes. In a regular table, these boxes will contain symbols of hydrogen and helium, elements in this period. In figure 5.11, we show instead of a letter indicating that the last added electron for the elements in these boxes is in 1s sublevel. In period 2, there are eight boxes. Instead of characters for eight elements, drawing 5.11 shows s in the first two boxes and p in the last six boxes, showing that 2s and 2p gravy are filled as electronic element configurations are completed in these boxes. Period 3 also has eight boxes that would match the electrons needed to fill the 3s and 3p cans. back now in Figure 5.8, which shows the order in which Fill. Note that 4s sublevel is filled immediately after 3p sublevel. Figure 5.11 shows that the elements whose last added electron enters the sub-level are in columns 1 and 2. So we have to start here a new period, period 4, and put boxes for items formed by filling 4s sublevel in these columns. Figure 5.8 shows that the next substodil to fill is 3d sublevel. These are the first d electrons added, so we start new columns for the elements formed by their addition. Ten electrons are needed to fill five d orbital stations, so we start ten columns in this fourth period by placing columns next to column 2 and between it and column 3. 4p sublevel is filled next, after 3d sublevel. Boxes for elements formed by filling the p orbital are in place under the boxes for the elements formed by adding 3p of electrons. By advising Figure 5.8, we see that the following filled sub-elements are in order: 5s, 4d and 5p. Boxes for elements formed by filling the orbits of these unders are located in the same way as in period 4. Just as period 4 contains more elements than period 3, period 6 contains more elements than period 5. Period 6 begins with elements whose last added electron is in 6s sublevel. The next step is where period 6 is different from period 5. Look again at figure 5.8 and note that 4f sublevel fills up after 6s sublevel and up to 5d sublevel. We're going to need 14 boxes to contain the electrons needed to fill seven f orbiting stations. These are the lantanide boxes shown below the table. There is some evidence that these orbits are not filled before one electron is in orbit 5d, so we showed in figure 5.11 a series of lantanids, a different view after the first column d. After 4f orbits are filled, the boxes are shown for the remaining elements formed by adding 5d and 6p electrons. The seventh period contains boxes for items formed by filling 7s, 5f (the acticide series shown below the table), and finally 6d under-sellers. Thus, figure 5.11 shows a close relationship between the configuration of the electron of the element and its location in the periodic table. This relationship is further expressed in the following titles, sometimes given to parts of the table: columns 1 and 2 s block columns 3-8 p block short columns d block lantanids and actinides f block groups of elements found in these blocks are also known by other names. B. Item categories in periodic table 1. Elements of representative elements in s and p blocks are known as representative elements or basic elements of the group. The term representative dates back to the early times when chemists believed that the chemistry of these elements is For all items. Group 8 is not always included in the representative elements, as the chemistry of noble gases is unique to them. In the period 7 7 Elements in block p. Period 7 Block P will contain elements with atomic numbers, more than 112; such elements have not yet been detected in the Earth's crust and have not been prepared by a nuclear response. In blocks s and p, the period in which the element occurs has the same amount as the highest energy level containing electrons in the ground-based atom. The number of columns in which the item is located is the same as the number of s and p electrons in that level. Sodium is a representative element with 11 electrons. Its electronic configuration: 1s22s2p63s1 Sodium is in column 1 of the third period. In the sodium atom, the main energy level containing electrons is the third energy level, and the energy level contains one electron. 2. Transitional elements (or transient metals because they are all metals) are those elements that are in the short columns of Block d. Many of these elements are probably familiar to you. Mint metals - gold, silver and copper - are here. So it is iron, the main ingredient of steel, as well as those elements that are added to iron to make specific types of steel: chromium, nickel and manganese. Block D is not filled in the 7th period. The reason is the same as the reason why the section of the 7th period is empty: these elements are not naturally found and are still not recognized as a product of the nuclear reaction. Many properties of transitional elements are due to the fact that in their electronic structures occupied with and d subuleed the highest energy very close in energy. 3. Elements of internal transition Elements of internal transition are in the block f periodic table (in two rows below the main body of the table). The elements in this unit are chemically very similar, which would seem reasonable when you consider that they have the same configuration of electrons at two external energy levels. Differences arise in the next further energy level. For example, the electronic configuration of cerium (Ce, #58) is: 1s22s22p63s23p64s23d104p65s24d105p66s24f2 and praseodymium (Pr, #59) is: 1s22s22p63s23p64s23d104p65s24d105p66s24f3 The only difference between the two configurations is 4f electrons. Both the fifth and sixth levels of energy contain electrons. Elements of the lantanide series are also known as rare earths. They are widely used in the production of monitors for color television. Elements of the series of acticides are radioactive, and only three are in a noticeable concentration in the earth's crust. Of the others, only a few have been found in trace amounts on Earth or in stars. All of them are produced in laboratories as products of nuclear reactions. C. Electronic configuration of noble gases; The main notation We created between the configuration of an element's electron and its location in a periodic table. Let's now look at the configuration of the electrons of noble gases, elements of the group 8 periodic table. The electronic configurations of these items are shown in Table 5.3. TABLE 5.3 Electron Configuration of Noble Gases (Group 8 Elements) Element Atomic Number Electronic Configuration It 2 1s2 Ne 10 1s22p6 Ar 18 1s22 s22p63s23p6 Kr 36 1s22s2p2p63s23p63d104s24p6 Xe 54 1s2222 s22p63s23p63d104s24p64d105s25p6 Rn 86 1s22s22p63s23p63p63d104s24p64d104f145s25p65d106s26p6s The symbol of noble gas, enclosed in brackets, is used to represent the filled cans. As an example, consider the electronic configuration of bromine: Br: 1s22s2p63s23p63d104s24p5 The first 18 electrons are in the same orbits as the argon atom (see table 5.3). If we use the Ar symbol to represent these 18 electrons, we can write an electronic bromine configuration like Br: Ar3d104s24p5 This device is useful because we can write electronic configurations faster. More importantly, this notation emphasizes the configuration of electrons at higher energy levels, where differences are important in determining the chemistry of an element. This use of noble gases to represent certain configurations is known as basic notation. The symbol of noble gas, enclosed in brackets, is the internal, filled orbits of the element. Additional electrons are shown outside the bracket in a standard way. Note that only noble gases can be used in the main notation. With this method, remember that while the internal configuration of the element can be written in the same way as that of noble gas, the energy of these internal electrons is slightly different. Table 5.4 in the main notation shows the electronic configurations of the elements in groups 1 and 6 of the periodic table. Notice how this method emphasizes a similar structure of items in a single column. TABLE 5.4 Electronic element configurations in groups I and VI, using basic notations Group 1 Group 6 H 1S1 Li (He) 2s1 Na (Ne)3s1 K (Ar)4s1 Rb 'Kr'5s1 Cs7s1 O It 2s22p4 S Ne3s23p4 Se Ar4s23d104p4 Te Kr5s24d105p4 Po Xe6s24f145d106p4 D. Valence ElectronsTable when discussing the chemical properties of the element, we often focus on electrons in the external busy energy level. These electrons of the outer shell are called valence electrons, and the energy level they occupy is called the valence shell. Valent electrons are involved in chemical communication and chemical reactions. The valence of the element's electrons is shown by presenting an element called the electronic-dot structure or structure of Lewis You, noticed in the writing of the configurations of electrons that sublevel sublevel The main energy level n is always busy before d electrons are added to the main energy level, moderate n - 1. Immediately after filling the d sublevel of principal level n - 1, the p sublevel of principal level n is filled, and the next sublevel filled will be the s sublevel of the n + 1 principal energy level. This order of filling is illustrated in the configurations of krypton, xenon and radon in table 5.3 and selenium, mazur and polonium in table 5.4. The significance of these observations is that in the electronic configuration of any atom the main energy level with the largest number of electrons cannot contain more than eight electrons. It also means that the atom's valence electrons are the electrons s and p in the most occupied energy level. Consequently, no atom can have more than eight valence electrons. Drawing the structure of the Lewis atom, we imagine a four-sided box around the symbol of the atom and believe that each side of this box corresponds to the orbital. We present every electron valence as a point. The first two valence electrons will be electrons; they will be represented by two points on the side (no matter which side) of the symbol. The valence electrons that are in the p shell are placed first, one on each of the remaining sides of the symbol, and then the second is added to each side. This method of filling is similar to the method used in drawing charts of electron configurations. As an example, consider the structure of Lewis's sodium. Looking back at table 5.4, we see that the main sodium notation is Ne3s1. This tells us that the sodium atom has one electron in the outer shell, so its structure is Lewis. The main notation for selenium is Ar3d104s24p4. Its structure of Lewis is. Ten 3D selenium electrons are not shown because they are not found in the outer shell, which is the main energy level of 4. Lewis's elements in the first three periods and the group 2 of the periodic table are shown in Table 5.5. 5.5.