

## 6.6

What is the fourth quantum number known as, what values can it have, and why is it important?	It is known as the spin quantum number (or $m_s$ ). It can be either $+1/2$ or $-1/2$ . It is important because it tells us that each orbital can have a maximum of only two electrons.
Explain the Pauli exclusion principle.	The Pauli exclusion principle says that no two electrons in the same atom may have identical values for all four quantum numbers (in other words, the maximum number of electrons in an orbital is 2)

Do not worry about remembering paramagnetism and diamagnetic.

## 6.7

Define electronic structure.	The arrangement of electrons in an atom.
How is atomic number symbolized?	Z
What defines atomic number?	The number of protons in an atom.
What are the two ways of expressing an atom's electronic structure?	By writing its electron configuration (with subshell designations and superscripts) or with orbital diagrams.
In an orbital diagram, what is important to remember about a subshell with only one electron?	All of the orbitals are drawn, despite the fact that only one may have an electron.
How are electron's spread in the orbitals of a subshell? What is this known as?	They are spread out as much as possible to give as few paired electrons as possible. This is known as Hund's rule.
Write the electron configuration of oxygen and draw its orbital diagram.	$1s^2 2s^2 2p^4$ , $1s \begin{array}{ c } \hline \uparrow\downarrow \\ \hline \end{array} \quad 2s \begin{array}{ c } \hline \uparrow\downarrow \\ \hline \end{array} \quad 2p \begin{array}{ c } \hline \uparrow\downarrow \\ \hline \end{array} \begin{array}{ c } \hline \uparrow \\ \hline \end{array} \begin{array}{ c } \hline \uparrow \\ \hline \end{array}$
Draw the mnemonic that gives the order in which subshells are filled.	See fig. 6.20 pg. 205 (shown below).
Which electrons are important in chemical reactions? What advantage does this have in writing electron configurations?	The outer most electrons. We are able to represent the electron configuration in a type of shorthand.
How are electron configurations written in shorthand?	1) Pick the noble gas that precedes the element, 2) write it in square brackets, 3) add the additional subshells with appropriate subscripts. E.g. Na $[\text{Ne}]3s^1$ .

## 6.8

List four elements with unusual electron configurations.	Cr, Cu, Ag, Au
In what way are they unusual?	The outermost d subshell "steals" an electron from the outermost s subshell to become either filled or half-filled.
What is the explanation for this?	There is an added amount of stability when a subshell is exactly filled or half-filled.

## 6.9

In what way does the periodic table offer supporting evidence for the quantum theory?	The periodic table consists of columns in groups of 2, 6, 10 and 14. This corresponds to the number of electrons that can occupy the s, p, d, and f subshells.
How can similar properties of elements within a column be explained with reference to the quantum theory?	All of the elements in a column have the same number of electrons in their outer most shells.
Give an example of the above statement	The alkali metals (Group 1A) all have one electron in their outer s orbital, and in solution lose one electron (giving them a charge of +1 and an electron configuration of the preceding noble gas).
What is meant by valence shell?	The occupied shell with the highest value of n.
What is meant by valence electrons?	The electrons in the valence shell.
What is the electron configuration of arsenic's valence shell if the electron configuration of arsenic is $\text{As} [\text{Ar}]3d^{10}4s^24p^3$ ?	The valence shell electron configuration is $4s^24p^3$ .
What is the point of knowing the valence shell electron configuration? Why not just stick to the electron configuration?	Valence electron configurations will become important later on when we learn about the bonding of elements to form compounds.
What is an easy way to figure out the value of n for an element's valence shell?	It will be the same as the period in which the element falls (see fig. 6.22 for periods).
Aside from fig. 6.20, what is another way to remember the order in which subshells are filled?	Remembering the basic structure of the periodic table and the fact that the 3d subshell follows the 4s subshell will help to remember the order. See fig 6.22 (below).

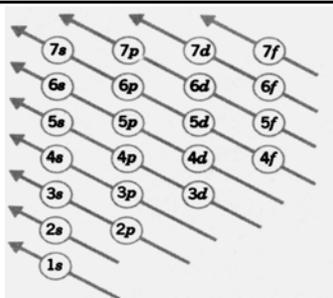


Figure 6.20 (pg. 205)

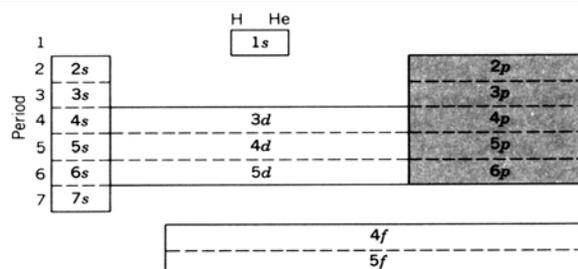


Figure 6.22 (pg. 209)