



## Atomic Theory & Structure

### EXERCISES

#### A. True or false:

- 1) An atomic orbital is a region in which we may expect to find an electron.
- 2) The maximum number of p-electrons in the first orbital shell is six.
- 3) In the ground state, electrons tend to occupy orbitals of the lowest possible energies.
- 4) The angular quantum number,  $l$ , specifies the shape of the electron cloud around the nucleus.
- 5) Dalton's Atomic Theory states that all atoms are composed of protons, neutrons and electrons.
- 6) The electron was discovered by J.J. Thomson.
- 7) The Pauli Exclusion Principle states that atoms of two different elements can have no two quantum numbers alike.
- 8) The third orbital shell can contain a maximum of eight electrons.
- 9) The principal quantum number,  $n$ , indicates the energy levels of the electrons relative to their distance to the nucleus.
- 10) In a given atom, electrons in the 3s and 3p orbitals will have the same  $n$  and  $l$  quantum numbers.
- 11) The fourth orbital shell can contain a total of 32 electrons.
- 12) The energy level of a 3d electron is higher than that of a 4s electron.
- 13) The larger the value of  $n$ , the greater the average distance of the electron from the nucleus.
- 14) All the elements in a group possess essentially the same outer-shell electron structure.
- 15) The Hund Principle states that electrons occupy the lowest-energy orbitals available before entering the higher-energy orbitals.
- 16) The electron structure for a carbon atom is  $1s^2 2s^2 2p_x^2$ .
- 17) The third orbital shell can contain nine electron orbitals.
- 18) The proton was discovered by James Chadwick in 1932.
- 19) A p orbital is spherically symmetrical around the nucleus.
- 20) The symbols for the four quantum numbers are  $n$ ,  $l$ ,  $m$ , and  $s$ .