The Quantum-Mechanical Model of the Atom – Study Guide

*section 6.3 in OpenStax*

**The Wave/Particle Nature of Matter**

**Complimentary Properties** are\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.**

**Uncertainty Principle:** the more accurately you know the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of a small particle, like an

electron, the less you know about its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Quantum Mechanics and the Atom**

The size, shape and orientation in space of an orbital are determined by three integer terms called **quantum numbers:**

* + **principal quantum number**, ***n*,**determines the \_\_\_\_\_\_\_\_ of the electron and the \_\_\_\_\_\_\_\_of the orbital

The principal quantum number can have the following values\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* + **angular momentum quantum number**, ***l ,*** determines the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the orbital

The values of ***l*** can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***s*** orbital ***l*** = \_\_\_\_\_\_\_ ***d*** *orbitals* ***l = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***p*** orbitals ***l*** = \_\_\_\_\_\_\_\_\_\_\_ ***f*** *orbitals* ***l = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

* + **magnetic quantum number, *ml ,***  determines the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the orbital

The values of, ***ml ,*** range from \_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_ including \_\_\_\_\_\_\_\_.

Complete the table describing orbitals in the n=4 energy level:

|  |  |  |
| --- | --- | --- |
| ***l*** | Possible ***ml*** values | Orbital name(s) |
| 0 | 0 | \_\_\_\_\_ (1 orbital) |
| 1 | -1, 0, +1 | \_\_\_\_\_ (3 orbitals) |
| 2 | \_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_,\_\_\_\_\_ | 4\_\_ (\_\_ orbitals) |
| 3 | \_\_\_\_,\_\_\_\_,\_\_\_\_,\_\_\_\_,\_\_\_\_,\_\_\_\_,\_\_\_\_ | 4\_\_ (\_\_ orbitals) |

Total number of orbitals = \_\_\_\_\_\_\_\_

**End of Chapter 6 Practice Problems**

#35, 37, 41

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”