

Notes: Atomic Orbitals

BIG IDEAS

DETAILS

Quantum mechanical model	This is the current model of the atom - the next model after the <u>Bohr</u> model. In this model Schrodinger said electrons were not <u>orbiting</u> the nucleus, but instead there are areas where there is a high <u>probability</u> of finding electrons.																						
Atomic Orbitals	Orbitals are regions of space around an atom where there is a <u>high</u> probability of finding an electron. These are similar to the <u>bunk beds</u> in the boarding house model examined in class.																						
S-orbitals	S-orbitals are <u>spherical</u> , and exist beginning on the <u>first</u> energy level. Energy levels are basically Bohr's rings. Every orbital can hold <u>2</u> electrons, regardless of what level it is in. The S-sublevel only has 1 orbital.																						
P-orbitals	P-orbitals are <u>dumbbell</u> or peanut shaped. There are <u>3</u> possible ways to orient these - meaning there are <u>3</u> orbitals in the P-sublevel. There is <u>NOT</u> a P-sublevel in the 1st energy level - it exists for the first time at the 2nd energy level. Because there are 3 orbitals, a total of <u>6</u> electrons can be held in the P-sublevel. The three orbitals in the P-sublevel <u>overlap</u> each other and all exist at the same time.																						
D-orbitals	D-orbitals have <u>5</u> possible shapes, or orbitals within the D-sublevel. The D-sublevel begins to exist only at the <u>3rd</u> energy level. Each orbital can still only hold 2 electrons, so the D-sublevel can hold <u>10</u> total electrons																						
F-orbitals	F-orbitals are even more complicated! There are <u>7</u> different shapes, and the sublevel is seen on the <u>4th</u> level and higher. Because there are 7 orbitals, <u>14</u> electrons can be housed in an F-sublevel.																						
Summary	<table border="1"> <thead> <tr> <th></th><th># of orbitals (orientations)</th><th>Total electrons</th><th>Starts at energy level</th></tr> </thead> <tbody> <tr> <td>s</td><td><u>1</u></td><td><u>2</u></td><td><u>1</u></td></tr> <tr> <td>p</td><td><u>3</u></td><td><u>6</u></td><td><u>2</u></td></tr> <tr> <td>d</td><td><u>5</u></td><td><u>10</u></td><td><u>3</u></td></tr> <tr> <td>f</td><td><u>7</u></td><td><u>14</u></td><td><u>4</u></td></tr> </tbody> </table>				# of orbitals (orientations)	Total electrons	Starts at energy level	s	<u>1</u>	<u>2</u>	<u>1</u>	p	<u>3</u>	<u>6</u>	<u>2</u>	d	<u>5</u>	<u>10</u>	<u>3</u>	f	<u>7</u>	<u>14</u>	<u>4</u>
	# of orbitals (orientations)	Total electrons	Starts at energy level																				
s	<u>1</u>	<u>2</u>	<u>1</u>																				
p	<u>3</u>	<u>6</u>	<u>2</u>																				
d	<u>5</u>	<u>10</u>	<u>3</u>																				
f	<u>7</u>	<u>14</u>	<u>4</u>																				