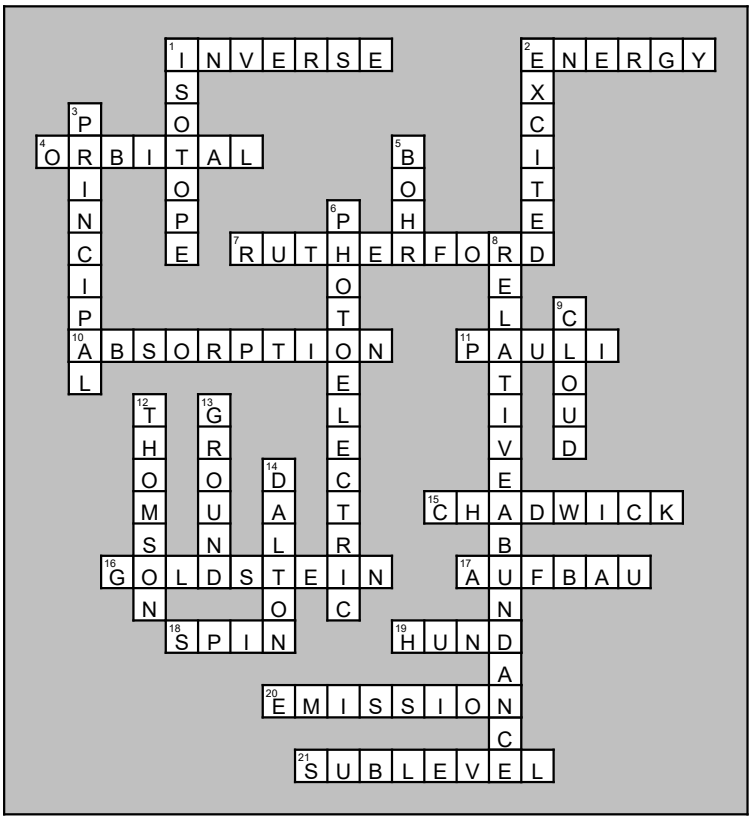
Crossword



Across

1. Frequency and wavelength have this relationship with the speed of light: c = f x lambda.
2. Photon ___ can be calculated using E = hc/lambda. Relates the wave-particle duality of light and electrons.
4. Quantum number defining the orientation of the sublevels. Contain a maximum of TWO electrons per ___. s has 1 __; p has 3 ___s; d has up to 5 ___s; and f has up to 7 ___s.
7. Original "planetary" model of the atom. Identified a "nucleus" and orbits (electrons) outside the nucleus. Could not explain emission and absorption spectra.
10. Spectra formed when electrons in a lower energy state take in photon energy and jump to a higher energy level. Leaves a black "print" where color would form.
11. Exclusion principle, meaning that no two electrons can possess the same 4 quantum numbers. Orbitals can contain a maximum of 2 electrons that must spin in opposite directions.
15. Discovered the "neutron" which did not deflect or attract within an electric field, having the same mass as a proton.
16. Discovered "canal rays" (protons) which responded opposite to the cathode rays (electrons). These particles were positively charged with significant mass.
17. Principle that electrons always occupy the lowest energy state possible unless excited by outside energy input. Affects the order of quantum numbers ... 1s 2s 2p 3s 3p 4s 3d (notice 4s comes before 3 d).
18. Fourth quantum number designated by up and down arrows or clockwise/counterclockwise.
19. Rule that within any sublevel, all the orbitals of that sublevel (p, d or f) must have 1 electron before any orbital can have 2 electrons (full).
20. Spectra in which light is given off as electrons return from an excited state to a lower energy state. "Fingerprint" of gaseous elements.
21. Designated by "s, p, d, and f", corresponding to the shape of the orbitals. 1s ... 2s 2p ... 3s 3p 3d, etc.

Down

1. Atoms having the same atomic number, therefore, the same properties, but a differing mass number due to a different number of neutrons.
2. State in which an atom absorbed energy so electrons jump to higher (than normal) energy levels or quanta. The atom is unstable.
3. Quantum number related to the size of the electron cloud in an atom (n). Corresponds to the row on the periodic table. The number of sublevels for any energy level equals "n".
5. Proposed that electrons orbited nucleus in specific circular paths. Only worked for hydrogen atom. He did develop quantum / energy levels in which electrons exist in a specific orbit, not gradual.
6. Effect observed in remote controls where an frequency of light is high enough to eject electrons from a metal, showing the particle nature of light. E = h f.
8. The weighted average mass of an atom determined by multiplying the mass of each isotope of an element by its natural abundance. Then, add the products.
9. The electron ___ theory in which electrons are expected to be found 90% of the time. Based on probability. Schrodinger defined standing waves of energy in atoms as part of the wave-particle duality of light and electrons.
12. Discovered "cathode rays" (electrons). Plum pudding model which has two charges. The negative charge is suspended in a positive "pudding" of charge.
13. State in which an atom exists at its lowest, most stable, energy level.
14. Coined the word "Atom" and defined it as a discrete, indivisible particle as the building block of all matter. He also understood the law of definite proportions and stated that atoms of the same elements have the same properties.