

CHAPTER 3 SUMMARY

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Evolution of Atomic Theories		
Atomic theory	Key experimental work	Contribution to theory
Rutherford	-alpha particle scattering through gold foil	-nucleus
Bohr	-hydrogen spectral lines	-quantized energy levels (principal quantum number)
Quantum Mechanics	-hydrogen spectral lines made up of closely spaced lines	-secondary quantum number
	-splitting of spectral lines caused by a magnetic field	-magnetic quantum number
	-magnetism	-spin quantum number
	-wave and particle properties of light and electrons	-wave nature of electrons -wave mechanics

- Planck: first suggestion of a quantum of energy
- Bohr: first use of quantum idea in an atomic model
- Sommerfeld: idea of subshells or sublevels leading to shapes of orbitals
- de Broglie: idea of wave nature of electrons
- Einstein: photon theory to explain photoelectric effect using quantum idea; integral to the development of the Bohr theory
- Schrödinger: extended de Broglie's idea to develop a mathematical model of an atom based on wave mechanics
- Heisenberg: developed probability interpretation of quantum mechanics

- (a)

1s		1s
2s		2p
3s		3p
4s	3d	4p
5s	4d	5p
6s	5d	6p
7s	6d	

4f
5f

- (b) Most of the empirical justification comes from the study of atomic spectra but other evidence also comes from physical and chemical properties of elements.
- (c) Quantum mechanics theory of electron energies in orbitals.