Atoms

	Nucleus	***Electron "cloud" of orbitals***
Components	Protons (which have positive charge) & Neutrons (which carry no charge)	Electrons (which have negative charge)
Significance to characterization of elements and atoms	Number of protons ("atomic number") is the defining characteristic of an element (e.g., Fe is defined as all atoms with 26 protons). Number of protons plus number of neutrons defines the isotope of an element (e.g., ^{56}Fe has 26 protons and 30 neutrons).	for example, $^{56}Fe^{2+}$ Difference of number of electrons from number of protons defines the charge on an atom. For example, among atoms of iron, all with 26 protons, Fe^{2+} has 24 electrons and Fe^{3+} has 23 electrons, whereas elemental (uncharged) Fe has 26 electrons.
Fixity of components	Number of protons and number of neutrons in nucleus do not change, except in event of radioactive decay, and the vast majority of atoms are not radioactive.	Electrons come and electrons go. A sulfur atom, with atomic number 16, can change from S^{6+} with ten electrons to S^{2-} with 18 electrons, and back, over and over again.
Mass	The mass of a proton is 1836 times that of an electron, and the mass of a neutron is 1839 times that of an electron. Thus the vast majority of the mass of an atom is in the nucleus.	Only about 0.05% of the mass of an atom is outside the nucleus.
Radius	The nucleus of a typical atom has a radius of about 5 femtometers, or 0.000005 nanometers The red nucleus shown here is 100 times too large to be to scale to the yellow atom shown.	An atom has a radius on the order of 0.1 nanometers, or 2×10^4 times that of the nucleus.
		Electrons thus, paradoxically, occupy the vast majority of an atom's volume but are a tiny proportion of its mass.
Significance to processes	Radioactive decay is largely a process of the nucleus. Alpha decay emits a particle of two protons and two neutrons from the nucleus. Beta decay converts a neutron to a proton with the emission from the nucleus of an electron, which is lost into the great flotsam and jetsam of electrons. Fractionation of isotopes of one element is separation by mass, which depends on the number of neutrons in the nucleus. For example, the lesser mass and thus faster vibration of lighter isotopes means that ^{12}C is favored over ^{13}C in photosynthesis and ^{16}O is favored over ^{18}O in evaporation of H_2O.	Bonding of atoms is effected by electrons, either by their sharing in covalent bonding, their flow from atom to atom in metallic bonding, the localization of their probability in molecular bonding, or their difference from number of protons per atom, yielding atomic charge and thus electrostatic attraction, in ionic bonding.