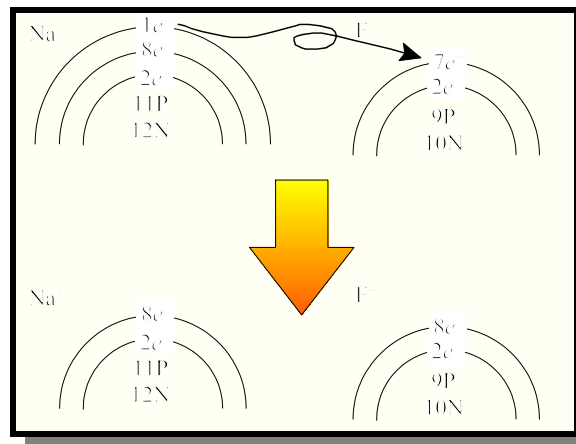


## Losing and Gaining Electrons

Atoms gain or lose electrons in such a way that they complete their outer shells. An outer shell can never have more than 8 electrons. The first shell is small, so it can only hold 2 electrons. All other shells are complete when they are the outer shell if they contain 8 electrons. An arrangement of 8 electrons in an outer shell is called a stable octet. Elements with a complete outer shell are inert. They don't gain or lose electrons. Neutral atoms are atoms that have not gained or lost electrons. Their number of electrons and protons are equal, so their net charge is zero. **Ions** are charged atoms or groups of atoms. They are formed when atoms gain or lose electrons. Since the number of protons and electrons is not equal after electrons have been gained or lost, there is a net charge. Examples include:  $F^{-1}$  – 10 electrons, 9 protons; and  $Na^{+1}$  – 10 electrons, 11 protons. As a general rule, atoms with fewer than four electrons in their outer shells behave like losers and form ions with a positive charge, while atoms with more than four electrons in their outer shells behave like gainers and form ions with a negative charge.



Determine the charge on ions of each of the elements listed in the table below by filling in the table based on the examples provided using sodium and fluorine.

Element	Atom				Ion				Number of Electrons lost/gained
	Electron Configuration	Number of Electrons	Number of Protons	Charge	Electron Configuration	Number of Electrons	Number of Protons	Charge	
Na	2-8-1	11	11	0	2-8	10	11	+1	1 lost
F	2-7	9	9	0	2-8	10	9	-1	1 gained
Ca									
O									
Al									
Cl									
Mg									
N									
S									
Cu									
C									