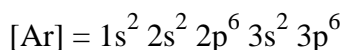


Electron Configurations for Neutral Transition Metal Atoms



neutral atom	electron configuration
Sc	$[\text{Ar}] 4s^2 3d^1$
Ti	$[\text{Ar}] 4s^2 3d^2$
V	$[\text{Ar}] 4s^2 3d^3$
Cr ^a	$[\text{Ar}] 4s^1 3d^5$
Mn	$[\text{Ar}] 4s^2 3d^5$
Fe	$[\text{Ar}] 4s^2 3d^6$
Co	$[\text{Ar}] 4s^2 3d^7$
Ni	$[\text{Ar}] 4s^2 3d^8$
Cu ^b	$[\text{Ar}] 4s^1 3d^{10}$
Zn	$[\text{Ar}] 4s^2 3d^{10}$

^aThe 4s and 3d orbitals are very nearly degenerate; electron-electron repulsion is minimized by placing one electron in each orbital. ^bThe energies of the 3d orbitals are slightly less than the energy of the 4s orbital; filling the 3d subshell provides a more energetically favorable configuration.

Electron Configurations for Positive Transition Metal Ions

- the energies of the 3d orbitals are significantly lower than the energy of the 4s orbital
- electron configurations usually written by filling in the electrons “from the bottom” (i.e., $1s^2, 2s^2, 2p^6$..., etc.); electron configurations for positive transition metal ions can be derived by removing electrons “from the top” of the neutral transition metal atom (*i.e., remove as many electrons as needed starting with the 4s electrons*)

Examples

