TL 7-17 (Ground state wave functions)

a) Sn (Z = 50)

spectroscopic notation: $[Kr]\ 5s^2\ 4d^{10}\ 5p^2$

more completely: $[1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6]\ 5s^2\ 4d^{10}\ 5p^2$

Using Fig 7-14, we see that 3d fills before 4s, then 4p, then 4d, then 5s, then 5p

b) Nd (Z = 60)

spectroscopic notation: $[Xe]\ 6s^2\ 4f^4$

For this Z, according to table 7-14, we fill in this order:

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6\ 4f^4\ 6s^2$

(4s ⇄ 4p ?)

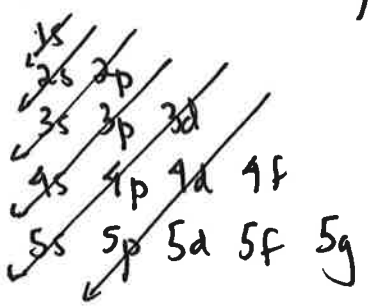
c) Yb (Z = 70)

Spect. notation: $[Xe]\ 6s^2\ 4f^{14}$

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 4f^{14}\ 5s^2\ 5p^6\ 6s^2$

(4f ⇄ 5s ?)

Generally speaking the orbitals fill like this,



but at atomic numbers greater than about Z = 24 (Chromium) things start getting strange with filling order.