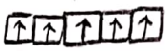
Saif Ali Post-lecture attempt 04/03/20

Chapter 9 pre-quiz

1. Draw box-and-arrow (orbitals) diagrams for the valence configurations of Fe, Fe^{2+}, and Fe^{3+}.

Fe → [Ar] $4s^2 3d^6$ ⟶ [Ar] 

Fe^{2+} → [Ar] $4s^0 3d^6$ ⟶ [Ar] 

Fe^{3+} → [Ar] $3d^5$ ⟶ [Ar] 

2. Predict the order of increasing atomic radius for each of the following sets of elements:

X < Y < Z
Smallest Largest

a) Ca, Mg, Be — Be < Mg < Ca

b) Zn, Cd, Fe — Zn < Cd < Fe

c) Al, Tl, Si — Si < Al < Tl

3. List the following orbitals in order of increasing energy: 3s, 2p, 3p, 4f, 3d, 5s, 4s

2p < 3s < 3p < 4s < 3d < 5s < 4f

4. Which atom has the valence shell electron configuration given? What are number of valence electrons for these atoms?

a) $6s^2$ ⟶ Barium, 2 valence e^-

b) $3s^2 3p^2$ ⟶ Silicon, 4 valence e^-

c) $4s^2 3d^{10} 4p^1$ ⟶ Gallium, 3 valence e^-

5. Arrange the following ions in order of increasing radius:

F^-, Na^+, O^{2-}, Mg^{2+}, N^{3-}

$Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$

6. How many electrons may be described by n = 2, l = 1? Use quantum numbers and spin to describe each.

n = 2 means size of orbital, L = 1 means subshell level of shell. The shell with this config is 2p which can house 6 electrons