

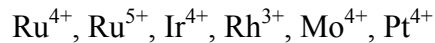
J.E. Greedan

Tutorial Questions:

1. Give the “crystal field” electronic configurations and spin quantum number, S, for the following:

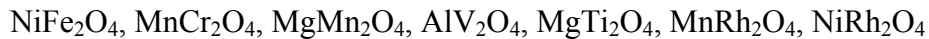
a.) The trivalent ions of the 3d series for both high spin and low spin cases where relevant.

b.) The following 4d and 5d series ions:



2. From your answers in part 1 a.) calculate the O.S.P.E. for the trivalent 3d ions for both high spin and low spin configurations.

3. Which of the following spinels will be normal, inverted or mixed?



4. Calculate pO @ 1000K for the two phase mixture of Fe_2O_3 and Fe_3O_4 , Given:

$$\Delta G^\circ_{1000} (\text{Fe}_3\text{O}_4) = -184.4 \text{ kcal/mole}$$

$$\Delta G^\circ_{1000} (\text{Fe}_2\text{O}_3) = -131.4 \text{ kcal/mole}$$

Note: ΔG°_{1000} values are per mole of oxide. The equilibrium between Fe_2O_3 and Fe_3O_4 should be written in terms of one mole of $\text{O}_{2(g)}$. Use $R = 1.987 \text{ cal/deg/mole}$.