Chapter 5

Conclusions

The characterization of products designated by structure and color of crystals as RedCubic, RedHexagonal, and Blue were carried out by ^{13}C – NMR, XRD, EPMA/EDX, crystal density, and UV – Vis spectrometry. The results agree with general formula of Blue, RedCubic, and AlCubic as $K_3[Al_{0.95}Cr_{0.05}(C_2O_4)_3]\cdot 3H_2O$, $KNa_2[Al_{0.95}Cr_{0.05}(C_2O_4)_3]\cdot 4H_2O$, and $K\,Na_2[Al(C_2O_4)_3]\cdot 4H_2O$, respectively. ^{13}C – NMR shows a singlet signal from RedCubic, RedHexagonal, and Blue at 167.023, 167.103, and 167.003 ppm, respectively. The singlet signal indicates the equivalence of the two carbon atoms in oxalate ligand implying the bidentate mode of bonding to the metal ions. The electronic transition $^4A_{2g} \rightarrow {}^4T_{2g}$ of RedCubic in powder and crystal forms were observed at 571 and 567 nm, respectively, while those of Blue at 580 and 582 nm. In the aqueous solution, RedCubic and Blue show transition at 574 and 575 nm, respectively. The identical electronic absorptions of Redcubic and Blue in aqueous solution explains the fact that both show the same greenish purple color in aqueous solution. In solid state, they have different colors and show slightly different absorption peaks. From XRD pattern and EPMA/EDX, the data of Blue are closely similar to $K_3Al(C_2O_4)_3\cdot 3H_2O$ implying their structures are similar. In studying compositions of these products by varying %Cr the results showed that %K and %Na were rather constant but %Al decreased when %Cr was increased.