



# The Physics of Soft and Biological Matter

## P.25 Electron transitions in $\text{Cr}^{2+}$ in the aqueous solutions of $\text{MgSO}_3 \cdot 6\text{H}_2\text{O}:\text{Cr}$

P Petkova<sup>1</sup>, V Nedkov<sup>2</sup>, J Tacheva<sup>1</sup>, P Vasilev<sup>1</sup>, I Ismailov<sup>1</sup> and Y Tzukrovski<sup>3</sup>

<sup>1</sup>Faculty of Natural Sciences, Shumen University “Konstantin Preslavsky”, Bulgaria, <sup>2</sup>Faculty of Chemistry and Pharmacy, Sofia University “St. Kliment Ohridski”, Bulgaria, <sup>3</sup>Department of Radiophysics and Electronics, Faculty of Physics, Sofia University “St. Kliment Ohridski”, Bulgaria

The cations of 3d metals in water and alcohol create aqueous complexes. The creation and stability of the aqua cations are important. The number of water molecules which are connected with the metal by the direct bonds metal-oxygen determines the properties of the complex. The classical investigations, for example: mobility of the ions, ostensible radii of the hydration ions and the entropy of hydration do not give detailed information for the aqua ions. This is the reason for the investigation of their spectral properties. These properties depend on the composition and the symmetry of the surrounding medium.

In this work, the absorption of the complex  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$  is measured in the spectral region 375 – 700 nm. The aqueous solutions of  $\text{MgSO}_3 \cdot 6\text{H}_2\text{O}:\text{Cr}$  are prepared with the concentrations 0.4%, 0.6% and 0.8%. The energies of the electron transitions in  $\text{Cr}^{2+}$  are calculated. The role of the spin-orbit coupling Hamiltonian is evaluated also. Zeeman splitting which is characteristic for  $\text{Cr}^{2+}$  is determined and discussed.

- [1] R. Drago, *Physical Methods in Chemistry*, 1981 (University of Illinois) Urbana
- [2] C.J. Ballhausen, *Introduction to Ligand Field Theory* 1964 (Mc Graw – Hill Book Company) Inc. New York
- [3] G.S. Nikolov, *Structure and Properties of the coordination compounds* 1977, Publishing house Science and Art, Sofia