**Abstract**

The aim of this doctoral thesis, which was made in the inorganic solid state chemistry, was the preparation and characterization by x-ray diffraction and vibrational spectroscopy of some hydrate iodates of cobalt, nickel and zinc with following compositions:

$Ni(IO_3)_2 \cdot 10H_2O$; $M(IO_3)_2 \cdot 4H_2O$ with $M$=Co, Ni; $M(IO_3)_2 \cdot 2H_2O$ with $M$= Co, Ni, Zn;
3 $Co(IO_3)_2 \cdot 2H_2O$; $Co(IO_3)_2 \cdot H_2O$ and $M(IO_3)_2$ with $M$=Co, Ni, Zn.

The structures of three novel hydrate iodates with the compositions $Ni(IO_3)_2 \cdot 10H_2O$, $Co(IO_3)_2 \cdot H_2O$ and $2Co(IO_3)_2 \cdot 3H_2O$ was examined. In addition the structure of $Zn(IO_3)_2 \cdot 2H_2O$ was solved by using single crystal data and the refinement of the structure of $Co(IO_3)_2 \cdot H_2O$ and β- $Ni(IO_3)_2$ by using powder data was presented.

The structural relationship of some transition metal iodates were intensively discussed. For most of them the distances of the intra- and intermolecular hydrogen bonds were calculated. The results showed the exceptionally strong hydrogen bonds in $Co(IO_3)_2 \cdot H_2O$.

The influence of the solid state is discussed on vibrational spectra of halogenates with undisturbed $C_{3v}$ symmetry.

Furthermore experiments with a diffusive infrared-reflection unity (DRIFT) were presented. The DRIFT spectroscopy is an interesting alternative for vibrational spectroscopic measurements. The advantages of these technique compared with common transmission infrared spectroscopy were explained. As a result of the experiments some new embedding materials were introduced.

Keywords:
Iodates, Hydrates, Hydrogen bonds; vibrational spectroscopy; Raman spectra; Infrared spectra; Diffuse reflectance; Vibrations in symmetry $C_3v$; Crystal structure; Praparation; Thermoanalyses; Raman-hightemperature-spectra; Cobalt; Nickel; Zinc;