| ESRF | **Experiment title:** Aqua-ion and solute structure in non-aqueous electrolyte solutions: An Anomalous X-ray Scattering study of the 1-1 electrolyte RbBr and 2-1 electrolyte $NiBr_2$ in ethanol and formamide solutions. | **Experiment number**: SC-453 |
|---|---|---|
| **Beamline**: ID01 | **Date of experiment**: from: 27-Nov-1998 to: 01-Dec-1998 | **Date of report**: 9-August-1999 |
| **Shifts:** 12 | **Local contact(s)**: M.CAPITAN and D.THIAUDIRE | *Received at ESRF:* |

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**Report:**

The aim of this experiment was to study the structure of $Rb^+$ and $Br^-$ in non-aqueous solvents and compare the structure with that obtained using water as a solvent (see reports on experiments SC-417 and SC-526 for studies of the structure of these ions in aqueous solutions). These data will allow us to study the effect of the dielectric constant of the solvent on the ion-solvent structure and compare with the theoretical predictions from the primitive model.

The samples used were RbBr in formamide ($CH_3NO$) and in $NiBr_2$ ethanol ($C_2H_5OH$). The choice of solvents was made so that their dielectric constants were significantly different from each other and from that of water (formamide: $\varepsilon$~130, ethanol: $\varepsilon$~30, water: $\varepsilon$~80).

Diffraction experiments were made at 200 and 5 eV from the Br K-edge (13.4 KeV) in both solutions and at 200 and 5eV from the Rb K-edge (15.2 KeV) for the RbBr solution.

The concentrations were 1.04 molal for the $NiBr_2$ solution and 1.62 molal for the RbBr one. Both solutions close to saturation to ensure reasonable statistics given that the salts were not very soluble in those solvents

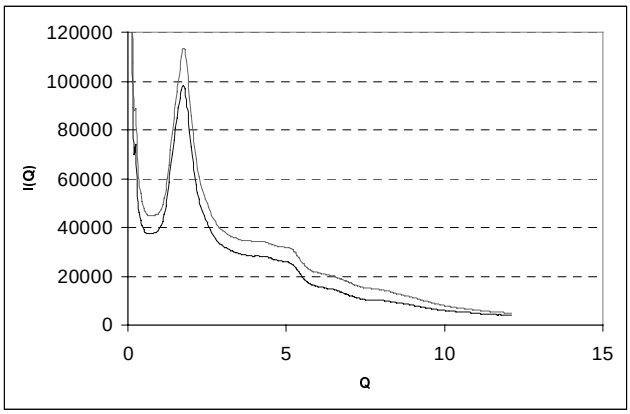


**Figure 1: RbBr in formamide, Br k-edge**

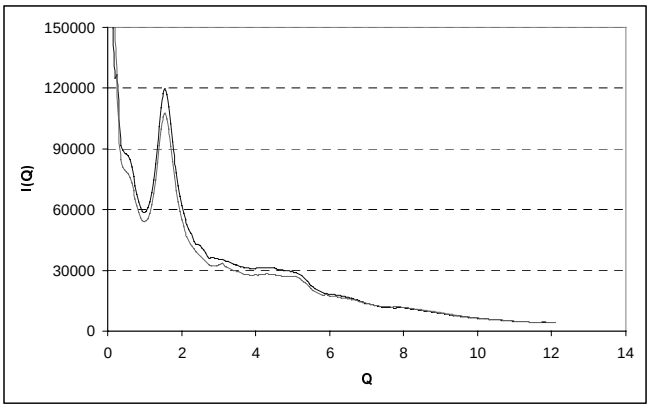


**Figure 2: $NiBr_2$ in ethanol, Br k-edge**

Figures 1 and 2 show the raw obtained around the Br k-edge. The differences obtained for this two systems are clearly observable but not as dramatic as in some other of our experiments (see reports for experiments SC-417 and SC-526), that being due to the much lower concentration. At the moment, the analysis and interpretation of these data is in an early stage. The method we will follow is the same we are using (and improving) for aqueous solutions.

Given our recent successes in the determination of $Rb^+$ and $Br^-$ local structures [1], we are optimistic about our chances in obtaining useful results from the above data sets.

[1] S. Ramos et al., to be published