X-ray Induced Radiation Damage in Taurine – a Combined X-ray and Raman Study

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Taurine is one of the lesser-known amino acids, nevertheless, it plays a role in the body and is essential to newborns of most mammal species, and it also protects our bodies against damage from radiation. Along with methionine, cystine and cysteine, it is a sulphur amino acid. The taurine molecule (NH_3^+-CH_2-CH_2-SO_3^-) is small and therefore a well suited model compound for this family of amino acids, as well as for describing the radiation damage in more complex sulphur containing amino acid systems.

Taurine exposed to ^{60}Co gamma rays have been shown to produce traces of different radicals [1], which are detectable with EPR. However, when taurine is irradiated with x-rays, an anisotropic change in the lattice constants is observed, where the crystal expands mainly along the c-axis of the unit cell. The system has been investigated with single crystal diffraction data at 120K and at room temperature, and separately with time resolved high resolution powder diffraction in combination with Raman spectroscopy. The Raman spectra reveal a red shift of the S-O stretching frequency as a function of exposure time. The single crystal data show a continuous rise of charge located approximately 1Å away from one of the oxygen atoms. This finding along with the Raman observation suggest the existence of an x-ray induced proton transfer within the taurine crystals rather than pure radical formation.

[1] Bulut A., Karabulut B., Tapramaz R., Koksal *F., Radiat. Phys. Chem.,* 2000, **58(2)**, 149-52.

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