

Poster Presentation

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High pressure studies of L-Serine-L-Ascorbic acid co-crystal

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Experiments for studying crystalline materials under extreme conditions are a powerful tool for investigating "structure-property" relationships. They also give information on the behavior of hydrogen bonds and are important both for materials science and crystal engineering. In addition, many processes in the living organisms are also related to mechanical stress. One of the most interesting tasks is to identify factors which influence the stability of a structure, or a part of the structure, at high pressure. Experiments on the systematic study of compounds in a wide range of pressures allow us to accumulate data that can be used to solve this problem. For a more complete picture, the mixed crystals of the selected compound are studied. Investigation of mixed crystals and cocrystals of interest can be compared with the crystals of individual compounds. We have chosen the structure of L-serine - L-ascorbic acid to be compared with those of L-serine and L-ascorbic acids for such a study. Phase transitions were previously reported to be induced by increasing pressure in both L-serine [1] and L-ascorbic acid [2]; moreover, the structure of L-serine was followed at multiple pressures by single-crystal and powder X-ray diffraction[3]. L-serine – L-ascorbic acid co-crystal was studied in the pressure range 0-5.4 GPa (at multiple points at every 0.5-0.7 GPa) by single-crystal X-ray diffraction and Raman spectroscopy. A phase transition has been detected and some rearrangement in the network of hydrogen bonds was observed. The high pressure data were compared with those for the individual structures of the L-serine and L-ascorbic acid. This work was supported by RFBR (grants 12–03-31541, 14-03-31866, 13-03-92704, 14-03-00902), Ministry of Science and Education of Russia and Russian Academy of Sciences.

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