Poster Presentation

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Difference of shear and impact treatment for mechanochemical co-cristallization.

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Currently one of the most popular methods to obtain various molecular co-crystals is mechanochemical synthesis, i.e. mechanical treatment of a mixture of powder reactants. Traditional approach for mechanical treatment is milling in a ball mill or grinding in a mortar. However, using these methods causes a number of problems related to investigation of the reaction's mechanism. For instance, ball mill produces impact treatment and shear treatment simultaneously and it is almost impossible to separate these two types of mechanical treatment. So, if detailed analysis of reaction is required, alternative methods of mechanical treatment are necessary. This study describes how mechanochemical co-crystallization of piroxicam and succinic acid has been investigated by using special model devices constructed for separated impact and shear mechanical treatment. Such devices allowed us to perform controlled impact or shear mechanical treatment, what was necessary for detailed investigation of mechanochemical processes for molecular crystals, based on the X-ray powder diffraction analysis. We could change and control energy and frequency of mechanical pulses in the impact model device and average velocity and pressure in the shear model device. For some other systems applying controlled impact treatment allowed us to detect the intermediate products of the mechanochemical synthesis of molecular complexes [1-2]. As for 'piroxicam – succinic acid" system, a comparison of impact and shear mechanical treatment had lead to opposite results for mechanochemical reactions – shear treatment appeared to disintegrate co-crystal obtained by impact mechanical treatment. Acknowledgements This work was supported by grants from RFBR (No. 11-03-00684, 12-03-31663, 13-03-00795, 13-03-92704) and Ministry of Education and Science Agreement (No. 14.B37.21.1093).

[1] *I. Tumanov, A. Achkasov, E. Boldyreva, et al., CrystEngComm, 2011, N. 13, P. 2213-2216.,* ***[2]*** *I. Tumanov, A. Achkasov, E. Boldyreva, et al., Russian Journal of Physical Chemistry A, 2012, Vol.86, No.6, pp. 1014 – 1017.*

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