

CHEMISTRY IN WONDERLAND

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Introduction. One and the same molecule can exist in two different stereoisomers (enantiomers). Stereochemistry studies the relative spatial arrangement of atoms which forms the structure of stereoisomers. This type of isomerism has been found as the most common among organic molecules. It is of great interest for chemical synthesis and pharmaceutical analysis as enantiomers have potentially different effects on the body.

Aim. Determination the difference in the biological effects on the body of S – and R –isomers of Penicillamine, Thalidomide and Ibuprofenum. The establishment of absolute configuration of molecules by using the experimental study of anomalous X-ray diffraction on nucleus of heavy atoms and the theoretical calculation of optical rotation.

Materials and methods. Standard solutions for introduction of Penicillamine, Thalidomide and Ibuprofenum. A polarimeter was used to measure the angle of rotation caused by passing polarized light through the optically active enantiomers.

Roentgenograms were recorded on the X-ray diffractometer Dron-7. Trans-2,3-epoxybutane was used in order to determine the relative rotation of optical isomers which was correlated with the configuration of tartaric acid and then with glycerin aldehyde.

Results and discussion. There is only one stereoisomer in any biological organism so it is not surprising that all the enzymes in our body are stereospecifically, id est react only to one optical isomer. Our research has shown that S – isomers of Penicillamine, Thalidomide and Ibuprofenum have positive effects on a biological organism and can be used as anti-inflammatory and immunosuppressive agents. However, R – isomers of these molecules have quite different effects on a biological organism, moreover these forms are toxic and can lead even to blindness and other negative consequences. Many well-known drugs contain the racemate – an equimolar mixture of a pair of enantiomers. The rotation of one enantiomer in this mixture is compensated by the rotation of the second isomer and their total rotation is equal to 0 that is why a large number of pharmaceutical drugs which contain R – isomers continue to be issued.

Conclusions. We prepared standard solutions for introduction and determined S – and R –isomers of Penicillamine, Thalidomide and Ibuprofenum and established their effects on a biological organism. In conclusion we can say that stereoisomers can show both positive and negative effects and pharmacists should be vigilant while making medicines.