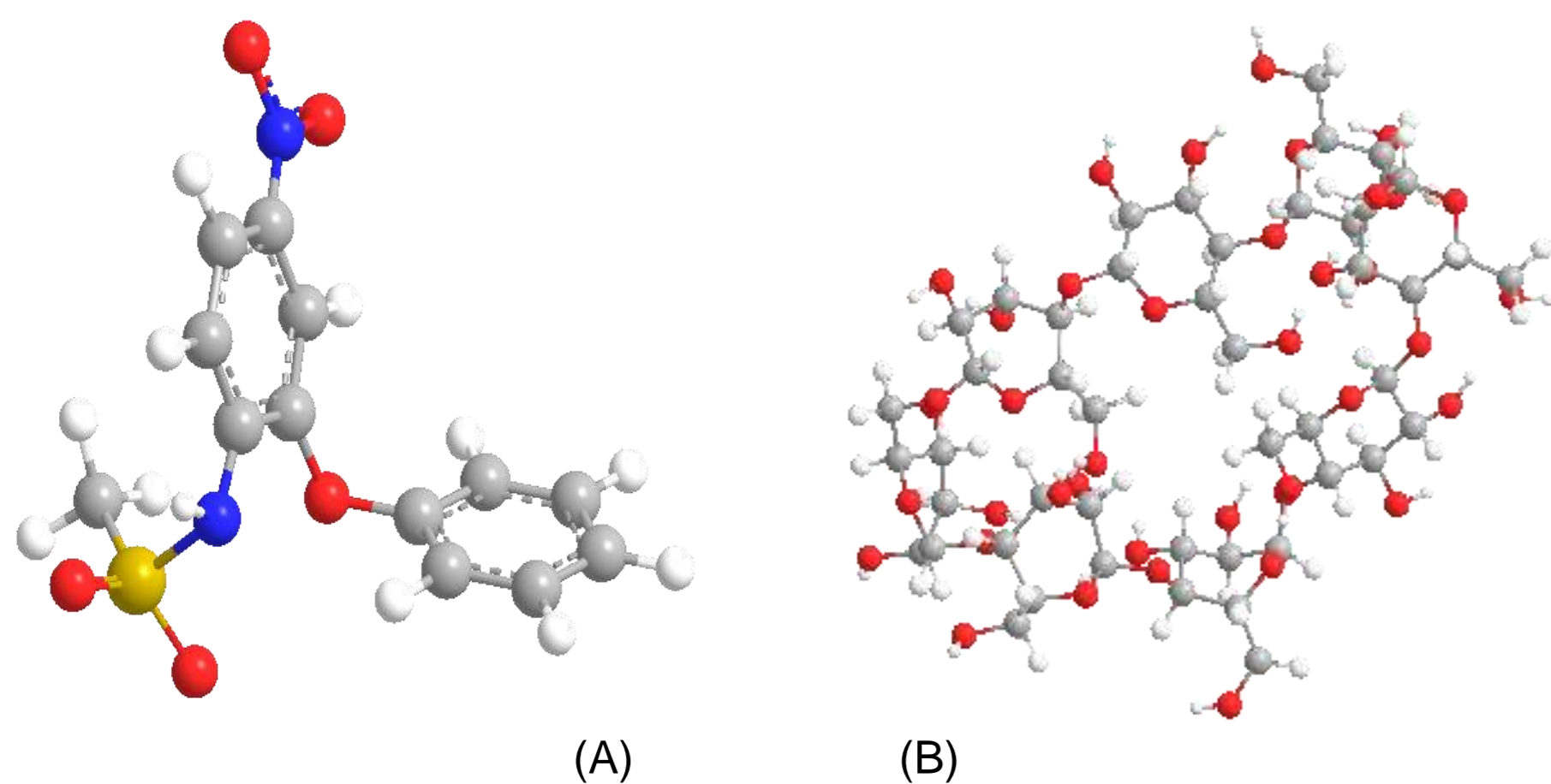


Study of factors affecting the process of complexation of nimesulide - γ -cyclodextrin

Viktoria Pavlova, Ekaterina Barteneva¹, Elena Grekhnyova¹
Kursk State University¹

INTRODUCTION & AIM

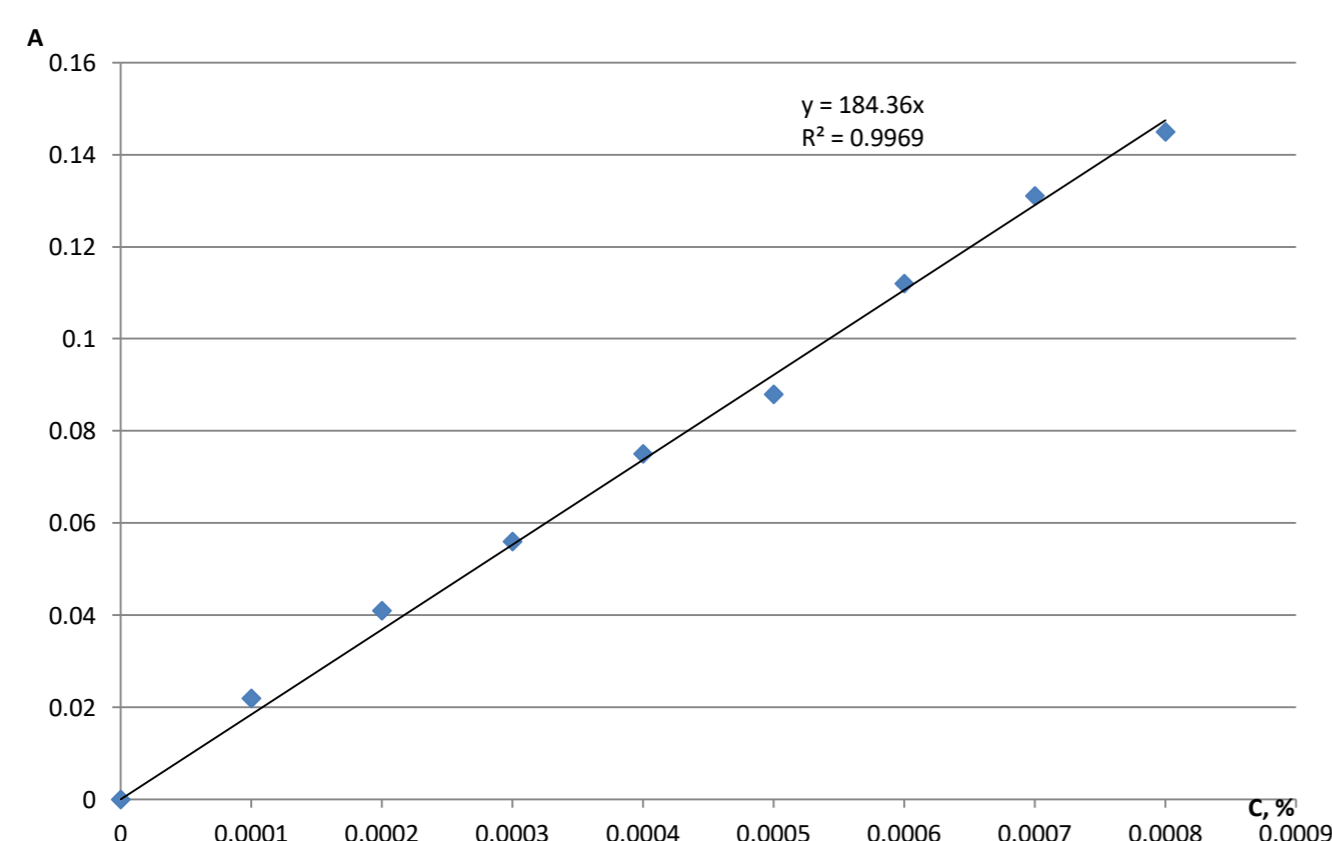
Complexation helps to increase the solubility as well as improve other qualities of drug substances. To study this process and subsequent preparation of compounds, we chose γ -cyclodextrin and nimesulide, a widely used drug for the treatment of acute and chronic pain.



The result of geometry modeling: (A) - nimesulide molecules; (C) - γ -cyclodextrin molecules

METHOD

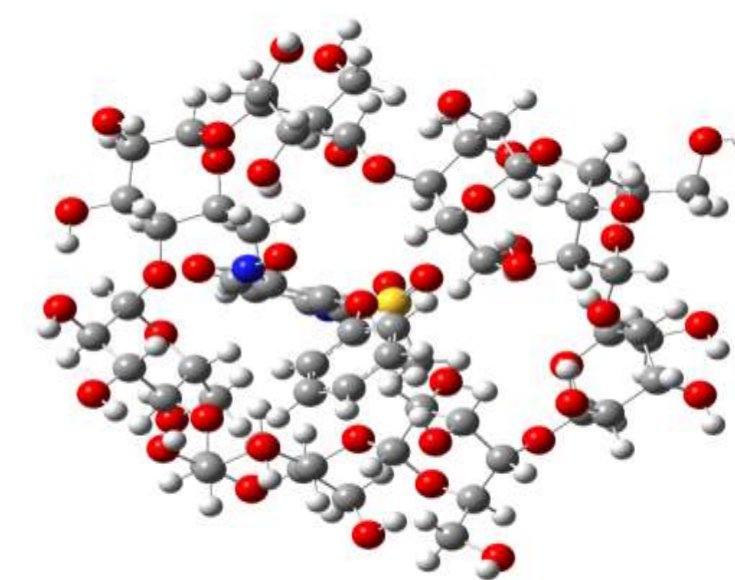
To obtain the inclusion complexes we used a combination of methods: co-evaporation, coprecipitation. Varying some parameters of complexation (pH of the reaction mixture (pH = 3, pH = 7), presence and volume of additional solvent (acetone)), several samples of putative complexes were obtained as a result of the experiment. Qualitative analysis was carried out by FTIR spectroscopy on a Fourier spectrometer ('FMS 1201', Russia). The quantitative composition of inclusion complexes was studied by calibration plot method on a Shimadzu UV-1800 UV spectrometer.



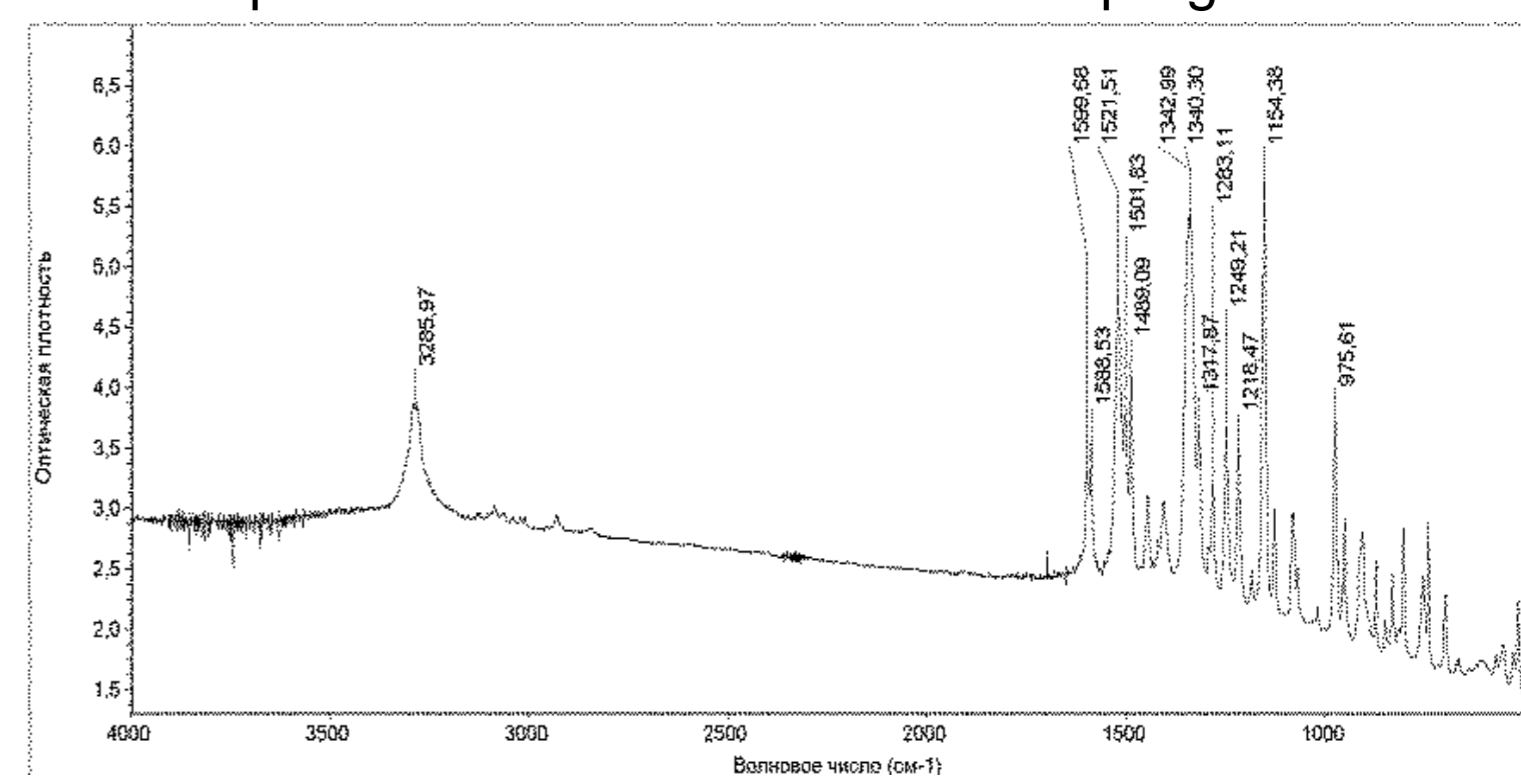
Calibration graph for estimating the content of nimesulide in the obtained samples by UV spectroscopy.

RESULTS & DISCUSSION

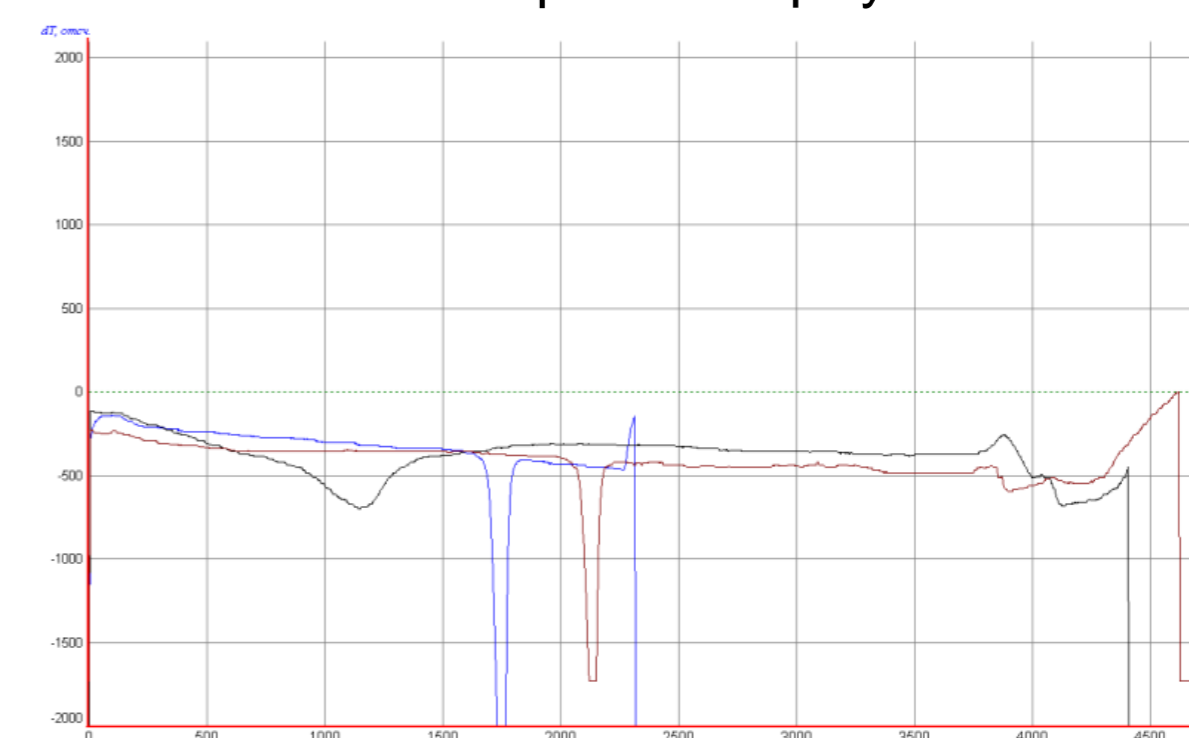
The obtained IR spectra suggest that some functional groups of nimesulide (S=O, R-NO₂) interacting with functional groups of γ -CD lead to a shift of the corresponding absorption bands. The formation of the complex was further confirmed by differential scanning calorimetry. The change in the enthalpy of phase transition with respect to the pure substance indirectly testify to the formation of the complex compound. Quantitative analysis showed that the most complete incorporation of nimesulide into the cavity of γ -CD is achieved with the addition of an additional solvent - acetone and the observance of an acidic environment in the reaction mixture. Change of other parameters (temperature, time of mixing the reaction mixture) did not have a noticeable effect on the process. Toxicological activity of the obtained compounds was not studied. Based on the confirmed safety of nimesulide and γ -CD, we assume that the complexes are also non-toxic.



3D model of the gamma-CD complex molecule with nimesulide, built and optimized in the ChemOffice 16.0 program



The IR spectrum of one of the obtained samples of the proposed nimesulide complex with γ -cyclodextrin.



Thermograms of samples of nimesulide (blue), γ -CD (black), obtained sample (red)

CONCLUSION

Thus, knowing the factors that have a predominant influence on the process of complexation, it is possible to obtain inclusion complexes of cyclodextrins with various drugs, creating new modified forms.

FUTURE WORK / REFERENCES

1) Barteneva E. S., Grekhneva E. V. Preparation and theoretical study of nimesulide inclusion complexes with β - and γ -cyclodextrins // Auditorium. 2022, 4 (36), 30-33.

2) Grekhneva, E.V.; Barteneva, mE.S.; Efanov, K.S. Peculiarities of Obtaining and Modeling the Structure of Nimesulide Clathrate Complexes with – and - Cyclodextrins. Chem. Proc. **2022**, 12, 53. <https://doi.org/10.3390/ecsoc-26-13707>