

Analysis of phase state diagrams of mixtures organic substances of natural and synthetic origin

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Abstract

Phase analysis of systems simulating the basis of the soft medicinal forms is of current interest because it is possible to determine the physical and chemical components incompatibility and to correct purposefully the ratio of base components in order to fulfill the requirements for the melting/solidification temperature range. We analyzed the phase bases diagrams and generalized the effects of physical incompatibility of the bases, containing organic substances of natural origin, with benzopyran derivatives, furan derivatives and p-aminobenzoic acid, which are used as vitamins and antibiotics in the soft dosage forms manufacture. Mixtures of organic substances of synthetic origin – polyethylene glycols of different molecular weight, low molecular weight polyethylene and paraffin – do not display physical incompatibility with low molecular weight ester compounds and furan derivatives, which are used in the drug manufacturing technology as preservatives and vitamins. The addition of high molecular weight ester compounds and polyethylene oxide derivatives (emulsifiers T-2 and TWEEN-80) significantly changes the melting/solidification temperature range of any kind of base. Practical recommendations for correcting the components ratio of the bases are presented in the article when the various auxiliary and pharmacologically active substances are added to the mixture.

References

- [1] Pharmaceutical Development: concept and practical recommendations. Scientific and practical guide for the pharmaceutical industry. Ed. S.N. Bykovsky and etc *Moscow: Publishing house "Pero". 2015.* 472p. (russian)
- [2] Innovative technologies and equipment for pharmaceutical production V.I. N.V. Menshutkina, Yu.V. Mishina, S.V. Alves and etc. *Moscow: Publishing house "BINOM". 2013.* 328p. (russian)
- [3] Gaillard, Yves; Mija, Alise; Burr, Alain et al. Green material composites from renewable resources: Polymorphic transitions and phase diagram of beeswax/rosin resin. *Thermochimica acta.* **2011.** Vol.521. No.1-2. P.90-97.
- [4] Sarbojeet Jana; Silvana, Martini. Phase behavior of binary blends of four different waxes. *Journal of American oil chemists society.* **2016.** Vol.93. No.4. P.543-554.
- [5] State Pharmacopoeia of the Russian Federation, edition XIII, т. I, II, III. <http://www.femb.ru>.
- [6] N.P. Kupriyanova, V.A. Likhoded, O.A. Minyaeva, Yu.V. Shikova, and Z.R. Nova. Selection an optimal basis for medical pencils with yodopiron. *Butlerov Communications.* **2014.** Vol.37. No.3. P.125-128. ROI: jbc-02/14-37-3-125
- [7] O.A. Minyaeva, A.R. Vorozheykina, N.P. Kupriyanova, E.A. Yarullina, O.V. Trifonova Phase analysis of binary mixtures of components that form the basis of soft dosage forms. *Fundamental research.* **2014.** No.8-1. P.119-123.
- [8] O.A. Minyaeva, N.P. Kupriyanova, U.A. Grigorieva. Influence of additives of nonionic surfactants emulsifiers on the melting point of soft dosage forms basis. *Modern problems of science and education.* **2015.** No.1 URL: www.science-education.ru/121-18159.
- [9] O.A. Minyaeva, N.P. Kupriyanova, U.A. Grigorieva, A.S. Sidorchenko, M.N. Zatssepina Influence of additives of preservatives and vitamins on melting point of soft medicinal forms basis. *Modern problems*

of science and education. **2015**. No.1-1.; URL: <http://www.science-education.ru/ru/article/view?id=19161>.

- [10] O.A. Minyaeva, A.R. Khismatullina, T.R. Jafarova, N.A. Tupkalo, V.A. Yakusheva, K.S. Pukhovskaya The problem of the use of antibiotics in the composition of soft medicinal forms. *Modern problems of science and education*. 2016. No.3.; URL: <http://science-education.ru/ru/article/view?id=24845>.
- [11] I.A. Muravev, V.D. Kozmin, A.N. Kudrin «Несовместимость лекарственных веществ. Moscow: Publishing house *Meditsina*." **1978**. 240p.
- [12] M.D. Mashkovsky Medicinal products. 16th ed., Revised, corrected and updated. Moscow: Publishing house *Novaya volna*." **2012**. 1216p.