

INVESTIGATION OF THE INTERACTION OF NATURAL DISPERSE MINERALS UKRAINE COLORING SUBSTANCES FROM SUGAR PRODUCTION

Stetsenko N.O, Podobiy O.V., Hrabovska O.V., Miroshnikov O.M.

National University of Food Technologies

Kyiv, Volodimirska st. 68, Ukraine, 03030

e-mail: starch @ nuft.edu.ua

Abstract text

To improve the quality of sugar should be possible to remove all other substance from the semi-sugar production. Removal of dyeing substances will provide the necessary minimum color of white sugar and its compliance with quality requirements of world standards [1]. In connection with this extremely urgent task is to find effective adsorbents for the purification of sugar solutions. These adsorbents can be natural disperse minerals of Ukraine, for example, palygorskite, montmorillonite, glauconite, and others [2].

The purpose of this investigation - a study of the adsorption capacity of natural disperses minerals in relation to the coloring substances from sugar production and selection of the most effective adsorbents.

To establish the mechanism and parameters of adsorption were are structured adsorption isotherms of dyes in natural dispersing minerals and calcium carbonate on the surface of which is the allocation of non-sugars in the production of. All the isotherms are convex curves with respect to the axis of equilibrium concentrations. It is indicated a high affinity of dyes to the sorbent and the possibility of their effective removal. Secreting of dye-stuffs is most full takes place on palygorskite, some worse - on glaukonite, adsorption ability of natural glaukonite and carbonate of calcium is practically identical. The got isotherms can be described equalization of Lengmyure monomolecular adsorption.

High adsorption properties of palygorskite can to explain by the mineral structure features, in the structure of which there are zeolite channels (primary pores), and also porous space in which the particles of mineral are agregative (second porosity). Glaukonite and carbonate of calcium have an external adsorption surface only.

Adsorption of dye-stuffs on the natural disperse minerals is conditioned two mechanisms of cooperation: van-der-vaals and hydrogen connections. Hydrogen connections arise up at sorbtion of adsorbate molecules on the active external groups of minerals. This is evidenced by decreasing values of the standard free energy of sorption ΔF , which is equal to palygorskite $-14,06 \text{ M}10^{-3} \text{ kJ/kg}$, for distillate glauconite – $-13,52 \text{ M}10^{-3} \text{ kJ/kg}$, for natural glauconite – $-13,01 \text{ M}10^{-3} \text{ kJ/kg}$, and calcium carbonate – $-13,22 \text{ M}10^{-3} \text{ kJ/kg}$.

With increasing temperature for all investigated systems tend decrease the amount adsorbed, indicating that the physical nature of adsorption.

Thermodynamic characteristics of adsorption process were calculated using the isosteric. The meaning of the Gibbs free energy is almost independent of temperature. Changes in entropy during adsorption had a negative value, which indicates that ordering in the system under the action of the adsorbent.

Effectiveness removal of dyeing substances from model solutions palygorskite and glauconite depend on pH and subsequently decreasing till at increasing its alkalinity.

Investigations to determine the influence of natural disperse minerals in the qualitative indicators of technological solutions of sugar production. The possibility of palygorskite and glauconite for adsorption purification of intermediates.

Referents

1. Адсорбция из растворов на поверхностях твердых тел/ Под ред. В.И. Лыгина. – М.: Мир, 1986. – 488 с.
2. Перспективи використання природних адсорбентів України в технологіях харчових продуктів/ Стеценко Н.О., Мірошников О.М., Манк В.В., Подобій О.В. – Materialy IV

mezinarodni vedecko-prakticka konference “Veda a technologie: krok do budoucnosti – 2008”. – Dil 15. – s. 87-89.

3. Стеценко Н.О. Дослідження фізико-хімічних процесів очистки цукрових розчинів природними дисперсними мінералами // Автореферат дис. ... канд. хім. наук: 02.00.11/ Український держ. універ. харч. технол. – К., – 1996. – 18 с.

Stetsenko N.O., Podobiy O.V., Grabovska O.V., Miroshnikov O.M.