

Influence of mechanical vibrations on the formation of hydrogels

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Abstract

The choice of an aqueous solution of vanadium-5 oxide as an object for the study of self-organization processes is caused by several factors:

1. The ability of the solution to form hydrogels, as well as a number of systems of colloidal nature
2. The essential role of water as an independent active chemical component, capable of forming a wide range of compounds with vanadium-5 oxide
3. The study of such a system is of great importance from the point of view of practical applications. One of the most important technologies for which the processes of spontaneous colloid- and gel-formation are essential is the technology of obtaining metallic vanadium or its chemical compounds.

The application of vibrations of different frequencies to an aqueous solution of vanadium pentoxide intensifies the process of gelation on metal probes. The lower the frequency of oscillations, the gelation process is accelerated. The optimal frequency in the range under study should be considered 15 kHz. It should be noted that solutions “remember” the external influence on them for a significant time. Gel formation rate remains high 21 hours after solution treatment. Repeated treatment of the solutions after 21 hours increases the rate of gelation. Applying oscillations to vanadium solutions probably contributes to micelle enlargement (coagulation process) and thus increases the gelation rate.

Biography

Essen N Suleimenov is a Senior scientist in Scientific-educational center of material science and corrosion problems Kazakh-British Technical University. He is graduated from the Kazakh Mining and Metallurgy Institute, metallurgy faculty in 1960 with a specialty of metallurgical engineer in the area of non-ferrous, rare and precious metals. Candidate of Technical Sciences (1970), senior research associate (1981), Doctor of Technical Sciences (2005). Fellow of the International Informatization Academy (November, 2004), member of the European Academy of Natural Sciences (January, 2007). After graduation was assigned to work in the Institute of Metallurgy and Ore Benefication of the Academy of Sciences of Kazakh SSR. During the work in IMAOB performed job duties of a senior laboratory technician (1960-1961), engineer (1961-1963), junior (1963-1971) and senior (1972-1986, 1995-2000) research associates, research team (multidisciplinary) leader (1985-1995), head of laboratory (2004-2005), head of department (2005-2006), deputy director for science (2000-2004), acting director of the Institute of Metallurgy and Ore Benefication (2004).



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