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P40

LOW-FREQUENCY NON-HEATING MAGNETIC FIELD PROMOTE RELAXATION RATE IN AOT REVERSE MICELLES WITH SOLUBILIZED MAGNETITE NANOPARTICLES

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Reverse micelles are self-organized nanosized structures consisting of amphiphilic molecules (surfactants) in non-polar solvents containing a water pool. The system equilibrium is usually followed by the formation of optically transparent solution; however further size and concentration changes can occur. Such processes affect properties of solubilized molecules such as proteins. In the work presented, we solubilize magnetite nanoparticles in AOT reverse micelles and study the influence of low-frequency non-heating magnetic field (LF-NH-MF) on kinetic parameters of equilibrium.

Magnetite nanoparticles (MNPs) were synthesized by thermal decomposition of Fe(Acc)3 in benzyl alcohol and characterized by TEM, Moessbauer spectroscopy, magnetic measurements and X-ray diffraction. MNPs dissolve in AOT reverse micelles. Solubilized MNPs (S-MNPs) were characterized by TEM and DLS.

The kinetics of establishing equilibrium in the micellar system was monitored spectrophotometrically by changing in p-nitrophenol absorbance at 305 and 380 nm. The change in absorbance over time is described by the sum of two exponentials. The dependence of rate constants (first-order rate constants) on w0 is linear, both with or without MNPs. Application of LF-NH-MF (50 Hz, 100 mT) increased the equilibrium establishment rate dramatically. A maximum is observed on the curve of the rate constant dependence on w0, and their values increased by an order of magnitude. The mechanism of such field effect, and the possibility of its application in biotechnology, for example, for enzyme solubilization is discussed.

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P41

ELECTROCHEMICAL METHOD FOR TESTING THE EFFICACY OF NEW ANTICANCER CONJUGATES FOR THE TARGETED DELIVERY

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Reactive oxygen species (ROS) is associated with induction of apoptosis. The study of intracellular ROS levels may represent one possibility to research the effects of drugs in inflammatory cells. ROS are released from cells during apoptosis, play a crucial role in the development of cancer and neurodegenerative diseases. Nowadays, there is the problem of developing methods for treating cancer tumors, and quickly evaluation of the anticancer drugs efficiency is the priority. The ROS determination using nanosensors in single cells has gained increasing attention. However, traditional fluorescent dyes have a number of disadvantages. These dyes are known to be intrinsically cytotoxic and thus can significantly alter cellular metabolism.

Here, we have developed an electrochemical method for determining the ROS inside the cells. Using this method, it is possible to evaluate the effect of the developed drugs on the cells. We evaluated the effect of ASGP-R (Asialoglycoprotein receptor) - specific carrier equipped by docetaxel on cancer cell lines with (HepG2) and without (PC-3) ASGP receptors. Our data obtained by using carbon-filled quartz nanopipettes with platinum tips showed