PHYSICAL PROPERTIES OF THE FERRIC STEAREATE MONOMOLECULAR LAYER AND PREPARATION OF RADIOACTIVE ^{55}Fe SOURCES

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In order to define conditions of preparing monomolecular ^{55}Fe radioactive sources (MMRS) physical properties of the ferric stearate monomolesular layer (MMLFeSt), obtained by adsorbing ferric ions from 10^{-6} M$FeCl_3$ solution on the stearic acid (HSt) MML, were examined. Influence of the ferric ions adsorption time and acidity of $FeCl_3$ solution on stability and mechanical properties of MMLHSt/FeSt were studied. In has been found that stable MMLFeSt can not be obtained under pH 2.7. Increasing the time of ferric ions adsorption on MMLHSt influences the amount of the built in ferric ions, and thus the mechanical properties of the MMLFeSt. Compressibility coefficient of this layer changes from 0,25 to 1 A^2/molecule/dyn/cm for the change of adsorption time from 40 min. to 7 hours. For further increase of the adsorption time this coefficient does not change. Acidity of the 10^{-6} M$FeCl_3$ solution influences the shape and charge of ferric ions, and therefore also the number of the built in ferric ions per one molecule of HSt in MML. This is reflected in the σ_o* dependence on the pH and in the appearance of the maximum σ_o value at pH 4.5 and minimum at pH 5.0.

Carrier free $FeCl_3$ in 0.1N HCl with 4 ugFe/ml and specific activity of 0.742 mCi/ml was used for the preparation of ^{55}Fe MMRS. After 2 hours adsorption of ferric ions from 2.7×10^{-7} M$FeCl_3$(pH=3) on MMLHSt, ^{55}Fe radioactive sources were obtained with one or more MML. Transference MMLFeSt onto VYNC foil as the solid substratum has been performed by the Langmuir-Blodgett method. Homogeneous, autoradiographically examined, ^{55}Fe sources of 20 m uCi/cm^2/MML were obtained. From the linear dependence between the counting rate of K Auger electrons of Mn and the number of MMLFeSt it has been concluded that self-absorbtion of K Auger electrons of Mn can not be detected, practically is zero, up to the examined source thickness of 3 MML.

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* σ_o - area/molecule MML at the point of change from "gaseous" into "liquid" state.