

## Tritium labeling of biological macromolecules and its application in surface science

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Tritium thermal activation method is a universal technique for radiolabeling of different classes of organic compounds. The method is based on the treatment of solid organic target with tritium atoms, which forms on hot W-wire. The yield of <sup>3</sup>H-compound is under the influence of several parameters. They are temperature of W-wire ( $T_w$ ), tritium gas pressure ( $p$ ), time of the exposure ( $\tau$ ) and temperature of the target ( $T_t$ ).

In this work we have introduced tritium label in globular proteins (lysozyme, human serum albumin, bovine serum albumin) and humic substances from different origins. For all these compounds, tritium thermal activation technique was applied. It was found that specific radioactivity <sup>3</sup>H-compound is higher if labelling is carried out at  $T_t=295-298$  K than at  $T_t=77$  K. For each group of macromolecules labelling parameters were varied that lead to the determination of the conditions under which high specific activity turns out at small amount of <sup>3</sup>H-by-products, which can be separated by any type of chromatography. Radiochemical purity of <sup>3</sup>H-compound was not less than 98 %.

<sup>3</sup>H-macromolecules were applied for studying their hydrophobicity and surface activity by means of scintillation phase method [1]. This method is based on measuring counting rate of <sup>3</sup>H-compound that is placed in aqueous/scintillator system. The scintillators based on octane, toluene, *p*-xylene and octanol were used. Since scintillation phase method is universal for adsorption and distribution of the compound, determination of both hydrophobicity and surface activity characteristics of biopolymers were obtained. That results in several important fundamental aspects such as (1) the formation of hydrophobicity and surface activity scales of humic substances; (2) the calculation of thermodynamical parameters of adsorption and distribution of macromolecules.

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