INTERACTION OF POLYNUCLEAR QUINONES WITH CARBON- AND OXYGENCENTERED RADICALS

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To date, anthracycline antibiotics, containing a quinoid fragment (doxorubicin, rubomycin, etc.), are widely used in medical practice for the treatment of cancer patients. The chemotherapeutic effect of such cytostatics is largely associated with their ability to enhance ROS generation and intensify subsequent radical processes. Thus, the study of polynuclear quinones interaction with various radical particles is of interest.

In this work we have studied the interaction of polynuclear quinones with α-hydroxyethyl radicals (α-HER) formed during γ-radiolysis of deaerated and oxygenated ethanol solutions.

It was shown, that during radiolysis in deaerated ethanol, the derivatives of naphthoquinone and anthraquinone effectively interacted with α-HER, oxidizing the latter and thereby blocking the process of their recombination. The tested compounds significantly reduced the radiation-chemical yields of 2,3-butanediol (on average 11 times) and increased acetaldehyde yields (on average 2 times).

It was found that naphthoquinone, 5-hydroxy-naphthoquinone and anthraquinone significantly inhibited radiation-induced oxidation of ethanol, as evidenced by a 1,5-fold decrease in acetaldehyde yields and a 54% decrease in the yield of total amount of peroxides in the presence of the additives. The observed effect is apparently due to the oxidation of α-HER by polynuclear quinones.

Thus, it was shown that polynuclear quinones are able to inhibit both free-radical recombination and oxidation of radical particles in chemical models.