RADIATION DECHLORINATION OF PCE IN AQUEOUS SOLUTIONS UNDER VARIOUS CONDITIONS

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Radiation technology of water purification from chlorinated compounds seems to be one of the promising method (Getoff, 1996), analogously as it was shown (Múèka et al., 2000) with radiation degradation of polychlorinated biphenyls (PCBs). A systematic study of dechlorination of tetrachloroethylene (PCE) in aqueous solutions (initial concentrations ranging from 9.2×10^{-6} to 2.5×10^{-4} mol dm^{-3}), initiated by γ-rays of ^{60}Co or by accelerated electrons (EB, 4.5 MeV) in presence of various modifiers (atmospheric oxygen, N_2O-oxide, HCO_3^-- and NO_3^-- ions as well as various pH-values), was the aim of this paper. The studies showed that both actual concentration c of PCE and radiation yield $G(Cl^-)$ decreased rapidly with increasing dose up to the dose of 2 kGy and the degree of dechlorination raised sharply in this dose-interval. The dechlorination was slightly promoted by atmospheric oxygen. Similarly, a promotion effect was detected in the case of the PCE-solutions saturated, prior to their irradiation, with the N_2O-oxide. On the other hand, a presence of NO_3^-- or HCO_3^-- ions in irradiated samples led to an inhibiting effect. The inhibiting effect increased markedly with increasing concentration of both at above-mentioned ions up to the concentration of about 100 mg dm^{-3}. A pronounced inhibition of γ-radiation dechlorination of PCE was observed in alkaline aqueous solutions. The results obtained in this paper support the idea that the radiation dechlorination of PCE in aqueous solutions proceeds *via* an oxidative mechanism in which the γ-irradiation was found to be more effective than the EB-irradiation.

References:

Getoff N., 1996. Radiation-induced degradation of water pollutants – state of the art. Radiat. Phys. Chem. 47, 581-594.

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