

PHOTOCATALYTIC DECOMPOSITION OF AQUEOUS SOLUTION OF LINDANE IN THE PRESENCE OF $PW_{12}O_{40}^{3-}$.

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EXTENDED ABSTRACT

Aqueous solutions of the stable pesticide lindane (γ - hexachlorocyclohexane) are fully decomposed to CO_2 , Cl^- and H_2O , upon illumination with ultra violet- near visible light, in the presence of a representative polyoxometallate, $PW_{12}O_{40}^{3-}$ at pH 1. The intermediate products which were detected during its photodecomposition are aromatic (dichlorophenol, trichlorophenols, tetrachlorophenol, hexachlorobenzene, 1,3-benzenodiol 4,6-dichloro, 3,4,6-trichlorobenzene 1,2 diol) non aromatic cyclic compounds (heptachlorocyclohexane, pentachlorocyclohexene, cyclohexene, cyclohexanone, cyclohexane) and aliphatic compounds (tetrachloroethane). These intermediates indicate that the main paths of the decomposition of lindane consists of dechlorination, hydroxylation, dehydration, formation of aromatic ring and destruction of the (C-C) bond. Furthermore, condensation products are being formed and more specifically polychlorinated biphenyls.

The number and structure of the intermediates leads to the conclusion that the mechanism of photodecomposition of lindane is very complicated. In general, similar intermediates have been detected during photolysis of lindane in the presence of titanium dioxide (TiO_2) according to literature data. This constitutes a strong indication that the photooxidation of lindane in the presence of polyoxometallates or TiO_2 takes place through the formation of a common oxidant, i.e., OH radicals, resulting from the reaction of the excited catalysts with water molecules.

Key words: Lindane, polyoxometallate, $PW_{12}O_{40}^{3-}$, decomposition, intermediate products.