## Dechlorination Reaction Mediated by Vitamin B<sub>12</sub> Modified Electrode

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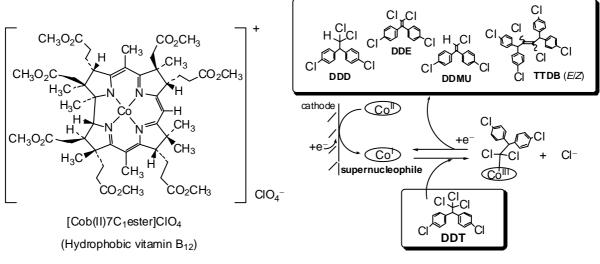
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We have been dealing with a hydrophobic vitamin B12, heptamethyl cobyrinate perchlorate [Cob(II)7C1ester]ClO4, which has ester groups in place of the peripheral amide moieties of the naturally occurring cobalamin, and performed various enzymic model reactions using hydrophobic vitamin B12 derivatives as catalysts by means of electrochemical methods.

Recently, it has been demonstrated that certain bacteria can use tetrachloroethane as electron acceptors by reducing it to cis-dichoroethane. An enzyme so-called *reductive dehalogenase* contains cobalamin as cofactor. A Co(I) species of cobalamin is a supernucleophile and reacts with an alkyl halide to form an alkylated complex with dehalogenation. Thus, the superior ability of cobalamin for reductive dehalogenation prompted us to investigate the catalysis of a cobalamin derivative for degradation of various halogenated organic compounds.

Two types of vitamin B12 modified electrodes were prepared by a sol-gel method and a chemical reaction on the surface of the electrode. A hydrophobic vitamin B12 was readily trapped on ITO electrode by a sol-gel reaction to form a noncovalent-type B12 modified electrode. On the other hand, a new hydrophobic vitamin B12, which has a trimethylsilyl group, was covalently immobilized into Pt electrode. Both vitamin B12 modified electrodes have high reactivity for organic halides to form dehalogenated products under the electrochemical reductive conditions.

1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane (**DDT**) is characterized by a pronounced insecticidal property and has been used worldwide for the last several decades despite its known hazardous effects on human health and wildlife. Therefore, much attention will be focused on the reaction between the hydrophobic vitamin B12 and **DDT** under electrochemical conditions. In the present work, electrolysis of **DDT** catalyzed by hydrophobic vitamin B12 was carried out as shown in Scheme 1.



Scheme 1.