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Strong biodegradability of vinyl polymers exerted by insertion of N-benzyl-4-vinylpyridinium PBVP(Br), halide into the main chain

Nariyoshi Kawabata[1,2]
[1]Kyoto Institute of Technology, Japan
[2]University of Shiga Prefecture, Japan

My research group accidentally discovered powerful bacterial cells in the living state on the surface of cross-linked poly(N-benzyl-4-vinylpyridinium bromide), PBVP(Br), during development of a new technology for water purification without leaving chemical materials in the treated water. During this research, we encountered with violent proliferation of bacteria on the polymer surface which was covered with proliferated bacteria, that resembled a group of breeding model though there was no organic material other than the polymer and bacteria. After about 10 years, we were shocked by violent digestion of cross-linked PBVP(Br) by activated sludge when placed in a continuous aerobic treatment of artificial sewage by activated sludge. We tried to prepare biodegradable vinyl polymers by connection of oligomers of vinyl compounds by BVP, since oligomers of vinyl compounds are biodegradable which is different from vinyl polymers. Half-life of polystyrene that contained 10.6 mol % of BVP (the oligomer portion was about octamer) was only 13 days when treated with activated sludge in soil in spite of the fact that no degradation of oligomers larger than trimer of styrene by bacterial strain was reported. We realized that BVP is not only a highly biodegradable chemical unit useful to connect oligomers, but also strongly stimulates microbes to degrade the oligomer portion connected to BVP. It was observed that oligomers of vinyl compounds are highly nutritive for microbes and are also easily biodegradable for the preparation of BVP.

Biography

Nariyoshi Kawabata has completed his PhD degree from Kyoto University in the year 1963. He was a Chemistry Assistant at Kyoto University from the year 1963 to 1969. He was an Assistant Professor of Kyoto Institute of Technology in the year 1969 and became a Professor in the year 1976. He was a Professor of University of Shiga Prefecture from 1999 to 2005. He has a faithful opinion about severe duty of chemists in the protection of natural abundant environment from harmful and obstructive chemical materials produced by chemists and chemical industry.

bfalq308@cwo.zaq.ne.jp

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