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Tadayuki Imanaka, Organic Chem Curr Res 2018, Volume:7
DOI: 10.4172/2161-0401-C1-021

4th European ORGANIC CHEMISTRY CONGRESS

March 01-03, 2018 | London, UK

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An efficient way of producing fuel hydrocarbon from CO_2 and activated water

Here, we show that petroleum can be formed efficiently at normal temperatures and pressures from carbon dioxide and activated water. The CO_2- nano-bubble containing water was treated with TiO_2 catalysis in the presence of oxygen under UV irradiation. The activated water was mixed vigorously with kerosene or light oil and carbon dioxide to form an emulsion. The emulsion gradually separated into a two-phase solution. After phase separation, the volume of kerosene or light oil, depending on which oil was utilized, increased by 5 to 10%. Oxygen gas is converted to ozone and further to reactive oxygen species such as superoxide anion radicals and hydroxyl radicals. The reactive oxygen species may reduce carbon dioxide to carbon monoxide, as follows, $2\ CO_2 \Leftrightarrow 2CO+O_2$ (reaction 1), the generated carbon monoxide may form hydrogen from water, as follows, $CO+H_2O \Leftrightarrow CO_2+H_2$ (reaction 2), as a total, $CO_2+H_2O \Leftrightarrow CO+H_2+O_2$ (reaction 3). All reactions were carried out at room temperature and normal pressure. The oil generation reaction may occur as radical emulsion polymerization in micelles and be written as follows, $nCO+(2n+1)H_2 \Rightarrow CnH_2n+2+nH_2O$ (reaction 4). From reactions 3 and 4, mass balance is shown as follows, $nCO_2+(n+1)H_2 \Rightarrow CnH_2n+2+nO_2$ (reaction 5).

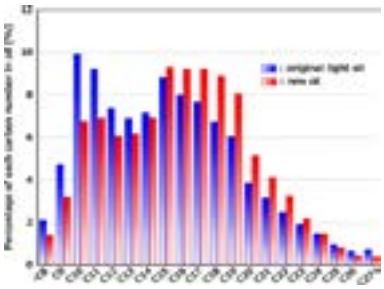

Figure 1: Comparison of composition between original light oil and new oil.

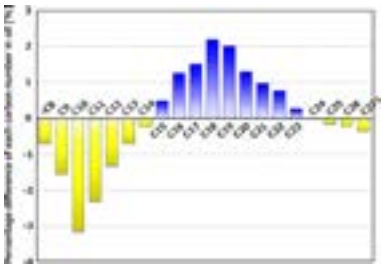

Figure 2: Difference in compositional ratio at each carbon number between new oil and original oil

Biography

Tadayuki Imanaka has graduated from Osaka University, receiving his Bachelor of Engineering degree in 1967. He finished his Post-graduate course at the same university, receiving his Master of Engineering degree in 1969. He was awarded the Doctor of Engineering degree from Osaka University in 1973. He was a Postdoctoral Research Associate at Massachusetts Institute of Technology (USA) from 1973 to 1974. He is an Associate Professor of Biotechnology at Osaka University since 1981 and Professor of Biotechnology at Osaka University since 1989. He is a Professor at Department of Synthetic Chemistry and Biological Chemistry, Graduate School of Engineering, Kyoto University since 1996 and Professor at Department of Biotechnology, Ritsumeikan University since April, 2008. He was awarded the following awards: Biotechnology Award of the Society for Bioscience and Bioengineering, Japan, in 2001; Arima Prize of Japanese Biotechnology Association, in 2001; Fellow in American Academy of Microbiology, in 2003; The Chemical Society of Japan Award, in 2005 and Japan Society for Environmental Biotechnology Award, in 2008. He was selected as a Member of Science Council of Japan, since 2005. He received the Purple Ribbon Medal from Japanese Emperor in 2010.

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