Energy Crisis Solution by Converting Methane and Methanol into Gasoline

Due to the increased energy demand world-over, efforts were made to develop alternative methods for the conversion of methane (a main constituent of natural gas and biogas) into value-added products like the liquid hydrocarbon fuels. As methane is one of the key greenhouse gases responsible for global warming, the current industrial practice of emission and or flaring of produced methane are likely to become difficult in the future. Therefore in remote places the methane that is produced must be converted into energy sources like liquid hydrocarbon fuels.

Scientists from CSIR-NCL have successfully converted methane and methanol into gasoline and have also received a US patent in April 2006.

The existing or known route for transforming methane into liquid hydrocarbons is: methane – syngas – gasoline. This is based on: methanol – to – gasoline (MTG) process. The researchers at CSIR-NCL have achieved a non-oxidative process by activation of methane gas and methanol. The existing route is highly exothermic, the heat evolved is difficult to remove because of which the process is becomes uncontrollable and also causes toxic benzene formation whereas the process suggested by CSIR-NCL is carried out under normal conditions without heat being evolved and there is no formation of toxic benzene. Thus, NCL process is not only energy efficient, but also thermo-neutral.

The process would help largely to tap the vast unused reserves of naturally available methane gas, which is considered to be one of the key greenhouse gases responsible for global warming.

Methane is converted at low temperature (600 °C) over bifunctional zeolite catalysts. There are many applications of this conversion one of which includes using the gasoline to run vehicles. The scientist at NCL tried to transform methane into liquid hydrocarbons but did not succeed in getting the desired results.

In brief, the formation of carbon monoxide in the methanol conversion in the presence or absence of methane was tested and found to be negligible. Formation of carbon monoxide was detected upon passing a mixture of methane and steam over the bifunctional zeolite catalyst at 550°C and it was found that there was no formation of carbon monoxide. The activation and conversion of methane in the process was confirmed by using carbon-labelled methanol and analysis of the aromatic hydrocarbons.

Scientists from CSIR-NCL could tap vast unused reserves of naturally available methane gas through their process for alternative energy and this gas is also considered as one of the greenhouse gases responsible for global warming. Many applications of this conversion process have been found and the most important is that gasoline can be used to run vehicles.

References:

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