Manufacture of wax compound from carbon dioxide by two step reaction

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FT synthesis via a reverse-water-gas-shift reaction, the two-step reaction of CO2 is proposed for an efficient utilization of carbon dioxide to produce clean transportable fuels or commodity chemicals. The produced paraffinic hydrocarbons having higher molecular weight are expected to be used as a lubricant base, which can enhance the energy efficiency of engines. In the direct hydrogenation of CO2 over Ru promoted Co catalysts, methane selectivity was prominently high up to about 60% or more although CO2 conversion reached only around 65%. In the two-step reaction, CO2 rich gas such as flue gas from the oxidation process of ethylene was first converted to CO in the RWGS reaction, and the produced CO rich gas was hydrogenated to higher hydrocarbons over CoRuZr/SiO2 catalyst in FT synthesis. In this paper, we focused on the development of reaction conditions on bench scale. As catalyst, the Co-Ru-Zr/SiO2 catalyst which was prepared by incipient wetness impregnation method was used. The optimum condition of the reaction was 210 oC of reaction temperature, 15atm of reaction pressure, 2000ml/g cat•hr of space velocity, and 1.8 of H2/CO ratio. At this optimum conditions, we obtained 82 % of conversion and 49% of paraffinic higher hydrocarbons.