

Catalytic Formation of Methane in a Cometary Impact

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The recent discovery of methane in the atmosphere of Mars has planetary scientists scrambling to explain its origin. In the oxidizing and intensive UV environment of the martian atmosphere, methane has a lifetime of about 300 years. This means the methane has been recently supplied or is actively being supplied. One plausible source of the methane is a recent cometary impact, but the statistical likelihood of such an impact is small. Given reasonable estimates of the methane content of a comet, a comet impact would have to have occurred in the last 19kyr. However, in the impact, if more methane is created than the comet's initial inventory, a comet impact could have occurred longer ago, increasing the impact probability, and supplied the present methane abundance. Formation of methane in a comet impact could be catalyzed by the presence of refractory metals grains as in industrial catalytic methane generation. In this work, I apply an astrophysical model to the fireball explosion following a comet impact to study the amount of methane generated by catalytic conversion of CO_2 , CO , and H_2O into CH_4 .