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# Product Analysis of Methane Activation using Noble Gases in a Non-thermal Plasma

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As interest grows in methane as a fuel source, its cost-effective activation has become a topic of intensive investigation. As part of these efforts, methane activation using non-thermal plasma was investigated in the presence of various noble gas additives, and the product gases were analyzed. The main products in all cases were alkane species such as  $C_2H_6$  and  $C_3H_8$ , which were produced independently of the noble gas; however, the conversion of methane was considerably affected by the identity of the noble gas. Because the formation of carbon was a severe problem even in the presence of the noble gases, oxidative methane conversion was also evaluated in terms of the carbon balance and product distribution. By adding oxygen to the methane conversion process, the formation of carbon could be suppressed but the production of higher hydrocarbons was also reduced dramatically. Based on these results, it was concluded that the conversion of methane can be enhanced by varying the discharge characteristics, but the problem of carbon balance must be solved without the addition of oxygen.

Keywords: Plasma, Methane, Reforming, Dielectric barrier discharge, Noble gas

## 1. Introduction

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