NOBLE METAL CATALYSTS AND PROCESSES FOR REFORMING OF METHANE AND OTHER HYDROCARBONS

ABSTRACT

Processes for converting methane and/or other hydrocarbons to synthesis gas (*i.e.*, a gaseous mixture comprising H_2 and CO) are disclosed, in which at least a portion of the hydrocarbon(s) is reacted with CO_2. At least a second portion of the methane may be reacted with H_2O (steam), thereby improving overall thermodynamics of the process, in terms of reducing endothermicity (ΔH) and the required energy input, compared to "pure" dry reforming in which no H_2O is present. Catalysts for such processes advantageously possess high activity and thereby can achieve significant levels of methane conversion at temperatures below those used conventionally under comparable conditions. These catalysts also exhibit high sulfur tolerance, in addition to reduced rates of carbon (coke) formation, even in the processing (reforming) of heavier (*e.g.*, naphtha boiling-range or jet fuel boiling-range) hydrocarbons. The robustness of the catalyst translates to high operating stability. A representative catalyst comprises 1 wt-% Pt and 1 wt-% Rh as noble metals, on a cerium oxide support.

[FIG. 2]