86-101660/16 E36 H04 SHEL 10.10.84
SHELL INT RES MIJ BV *EP -178-007-A
10.10.84-GB-025620 (16.04.86) C01b-03/36
E(10-E4E1, 10-J2D, 31-A1) H(4-E4) N(6)

Synthesis gas with increased hydrogen-carbon mono oxide ratio - enables reaction of carbon cpds. with optimal energy consumption and materials using low value fuel gases

C86-043483 E(AT BE DE FR IT NL SE)

Synthesis gas with an increased hydrogen to carbon monoxide ratio is produced from normally gaseous hydrocarbons by the following steps:
(a) at least one normally gaseous hydrocarbon is converted into a synthesis gas by partial oxidation with an oxygen-containing gas;
(b) at least one normally gaseous hydrocarbon is converted with steam into a gaseous mixture of hydrogen and carbon monoxide;
(c) the mixture is separated into a carbon monoxide containing stream and a hydrogen stream; and
(d) the hydrogen to carbon monoxide ratio of the synthesis gas produced in step (a) is increased by adding at least part of the hydrogen stream obtained in step (c) to it.

ADVANTAGE

Increasing the hydrogen to carbon monoxide ratio of a synthesis gas resulting from the conversion of normally gaseous hydrocarbons enables the reaction of the carbon compounds with an optimal or near optimal consumption of energy and materials in the manufacture of synthesis gas from gaseous fuels. By-products and waste products from chemical synthesis and natural gas can be employed as the gaseous fuels.

EMBODIMENTS

At least part of the carbon monoxide containing stream separated in step (c) is burned and part of this heat is used for the conversion of the normally gaseous hydrocarbons with steam in step (b). The hydrogen to carbon monoxide ratio of the synthesis gas is raised in step (d) to 1.8-2.5. The separation of step (c) is carried out by pressure swing adsorption process.

The synthesis gas with increased hydrogen to carbon monoxide ratio is at least in part catalytically converted into a product comprising a hydrocarbon mixture, which is separated into a gaseous stream comprising non-converted carbon monoxide and hydrogen and low boiling hydrocarbons, and at least one stream comprising normally

liquid hydrocarbons, which may be catalytically hydrocracked using at least part of the hydrogen stream separated in step (c), and the hydrocracked product is fractionally distilled and the products separated to give at least a normally gaseous fraction, one naphtha fraction, one kerosene fraction and one gas oil fraction; the gaseous fraction being recycled as feed to step (a) or (b) and/or is burned for generating heat for step (b).

The synthesis gas with increased hydrogen to carbon monoxide ratio is at least in part converted into a product comprising methanol which is separated into a normally liquid product comprising methanol and a gaseous stream comprising non-converted carbon monoxide and hydrogen at least part of this gaseous stream being burned to generate heat for converting the normally gaseous hydrocarbons with steam in step (b).(12pp1684RKMHDwgNo0/1)
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