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Synthesis of methanol from natural gas - by method suitable for use offshore on a floating vessel
C91-054651

Methanol is synthesised from natural gas by the steps
 (a) using enriched air produced by a membrane or molecular sieve as the oxidant in a partial oxidation reactor, wherein natural gas is reformed by the oxygen;
 (b) splitting the resultant reformed gas into two streams;
 (c) passing one stream to a carbon monoxide shift reactor in which some CO is reacted with steam to form hydrogen and CO₂;
 (d) separating the hydrogen from the shift product;
 (e) combining the hydrogen with the other stream; and
 (f) using the combined stream as feedstock to synthesise methanol.

ADVANTAGE

The method may be used in a floating vessel, e.g. a converted tanker, at an offshore location where space and weight are at a premium, and where violent motions may be experien-

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ced. Use of membranes or molecular sieves enables the plant to operate on unstable surfaces, as no gas/liquid system requiring stable contact is used. Use of a large steam reformer is avoided by using a partial oxidation reactor.

EMBODIMENT

The Fig. is a flow chart for a 2500 TPD methanol plant. Air is compressed at (10) and passed through membrane or molecular sieve separator (11). The nitrogen-enriched stream is heated at (12) and expanded in turbine (14) to provide shaft power, which may be used e.g. for the compressor. The oxygen-rich stream is compressed at (15), and fed with natural gas (16) to partial oxidation reactor (17), where a reformed stream comprising carbon monoxide hydrogen, steam, and a small amt. of unreacted methane is formed. The stream is cooled and split into stream (A) and stream (B).

Stream (A), after adjusting steam/CO ratio if required, is passed to shift reactor (18), and the product from there passed through water separator (19) and to molecular sieve unit (20) where hydrogen is separated from other gases.

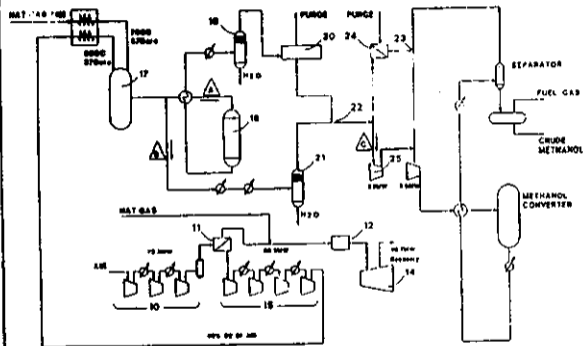
Stream (B) is cooled at (21) and combined at (22) with the hydrogen, and also with impure hydrogen recovered from the

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methanol synthesis loop by separator (24).

Combined stream (C) is passed to the methanol synthesis loop, which is conventional except for the high nitrogen content. A large purge stream is removed from the loop at (23) and either combined with the stream fed to unit (20), or the hydrogen is concentrated by membrane unit (24) and recycled; the nitrogen is rejected.

Crude methanol may be refined by centrifugal distillation. Streams rejected at (20) and (24) may be used as fuel. (10pp1644RKMHDwgNo1/1).



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