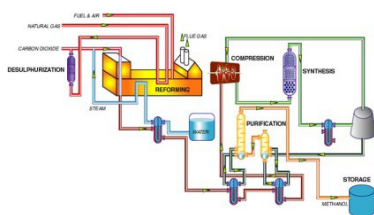


## The ICI Methanol Process



The Methanol plant at ICI in Billingham. Source: A Pictorial History of Stockton-on-Tees



Methanol made using the ICI Low Pressure Methanol Synthesis Process. Click picture for larger scale.

### STEP 1 : FEED PURIFICATION

The two main feedstocks, natural gas and water, both require purification before use. Natural Gas contains low levels of sulphur compounds and undergo a desulphurization process to reduce, the sulphur to levels of less than one part per million. Impurities in the water are reduced to undetectable or parts per billion levels before being converted to steam and added to the process. If not removed, these impurities can result in reduced heat efficiency and significant damage to major pieces of equipment.

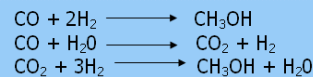
### STEP 2: REFORMING

Reforming is the process which transforms the methane (CH<sub>4</sub>) and the steam (H<sub>2</sub>O) to intermediate reactants of hydrogen (H<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO). Carbon dioxide is also added to the feed gas stream at this stage to produce a mixture of components in the ideal ratio to efficiently produce methanol. This process is carried out in a Reformer furnace which is heated by burning natural gas as fuel.



### STEP 3 : METHANOL SYNTHESIS

After removing excess heat from the “reformed gas” it is compressed before being sent to the methanol production stage in the synthesis reactor. Here the reactants are converted to methanol and separated out as as crude product with a composition of methanol (68%) and water (31%). Traces of byproducts are also formed. Methanol conversion is at a rate of 5% per pass hence there is a continual recycling of the unreacted gases in the synthesis loop.



This continual recycling of the synthesis gas however results in a build-up of inert gases in the system and this is continuously purged and sent to the the reformer where it is burnt as fuel. The crude methanol formed is condensed and sent to the methanol purification step which is the final step in the process.

### STEP 4 : METHANOL PURIFICATION

The 68% methanol solution is purified in two distinct steps in tall distillation columns called the topping column and refining column to yield a refined product with a purity of 99% methanol classified as Grade AA refined methanol.

The methanol process is tested at various stages and the finished product is stored in a large secured tankage area off the plant until such time that it is ready to be delivered to customers. Since 99% of our product is sold on the overseas market, it is shipped by ocean going tankers while local sales are made via pipelines and drums.

Source: The Methanol Industry in Trinidad