

NOTICE
RIGHT TO GRANT
SURRENDERED.

PATENT SPECIFICATION

Application Date: June 13, 1925. No. 15,398/25.

262,364

Complete Left: April 13, 1926.

Complete Accepted: Dec. 13, 1926.



PROVISIONAL SPECIFICATION.

Improvements in or relating to the Production of Keten.

I, HENRY DREYFUS, of 8, Waterloo Place, London, S.W. 1, a citizen of the Swiss Republic, do hereby declare the nature of this invention to be as follows:—

This invention relates to a process for the production of keten from mixtures of or containing hydrogen and carbon monoxide.

In the Specification of my Application for Patent No. 15,392 of 1925, (262,494) I have indicated the history of the gas reactions between carbon monoxide and hydrogen and the products obtained therefrom in the past, and the more recent researches which have been made in connection with said reactions. For the sake of brevity I do not repeat this here but refer to what I have stated in this connection in my said other specification, and I desire that this shall be understood as repeated in detail here.

My said specification concerns especially the production of methyl alcohol from mixtures of or containing hydrogen and carbon monoxide in certain relative proportions under the action of heat and pressure, with the aid of zinc oxide as catalyst, the formation of methyl alcohol taking place, as is believed, via intermediate formation of formaldehyde which is converted into methyl alcohol by splitting off carbon monoxide.

The object of the present invention is to produce keten from mixtures of or containing hydrogen and carbon monoxide by combination of these gases under heat and pressure in presence of catalysts.

For this purpose I employ the carbon monoxide and hydrogen in about the

relative proportions necessary to satisfy the chemical equation, say about 3 molecules of carbon monoxide to one molecule of hydrogen ($3\text{CO} + 2\text{H} = \text{CO}_2 + \text{CH}_4\text{CO}$), it being understood that I do not confine myself closely to these relative proportions of carbon monoxide and hydrogen.

For the purpose of the reaction I use catalysts or mixtures of catalysts capable of effecting combination of the gases to form methyl alcohol or other oxygenated organic compounds, such as zinc oxide, copper oxide, copper chromate, zinc chromate, zinc aluminates, potassium zincate or their mixtures of two together or several together, zinc oxide with potassium acetate or potassium carbonate, or zinc oxide with aluminium, copper or zinc or tin with potassium carbonate or sodium carbonate or their corresponding acetates, or even caustic alkali combined with zinc oxide or copper oxide. These catalysts are only enumerated by way of example, without being limitative, as other catalysts or catalyst mixtures of the class indicated may be employed, be it in the form of metals or their salts or mixtures of metals and their salts, especially salts of the type of chromates, vanadates etc., preferably when a catalyst of basic nature and preferably relatively strong basic nature is present.

In carrying out the process one may employ similar conditions of temperature and pressure etc. to those indicated for the production of methyl alcohol in my said other specification, for example temperatures below about 400° — 450° C., and preferably between about 200° and 300° C., and pressures which may be up to 200 atmospheres or more, variable according to the catalysts used, but

generally pressures of about 50 to 150 atmospheres.

Catalysts favouring the production of methane or more than traces of methane should be avoided.

In executing the process of the present invention the speed of passage of the gases has also an influence, as, if they are passed through the apparatus

at relatively low speed, hydrocarbons and higher alcohols may be formed.

Dated this 13th day of June, 1925.

T. L. WHITEHEAD,
Chartered Patent Agent,
Patent Department,
British Celanese Limited,
8, Waterloo Place, London, S.W. 1.

15

COMPLETE SPECIFICATION.

Improvements in or relating to the Production of Keten.

- I, HENRY DREYFUS, of 8, Waterloo Place, London, S.W. 1, a citizen of the Swiss Republic, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—
- This invention relates to a process for the production of keten from mixtures of or containing hydrogen and carbon monoxide.
- In the Specification of my Application for Patent No. 15,392 of 1925, (262,494) I have indicated the history of the gas reactions between carbon monoxide and hydrogen and the products obtained therefrom in the past, and the more recent researches which have been made in connection with said reactions. For the sake of brevity I do not repeat this here but refer to what I have stated in this connection in my said other specification, and I desire that this shall be understood as repeated in detail here.
- My said specification concerns especially the production of methyl alcohol from mixtures of or containing hydrogen and carbon monoxide in certain relative proportions under the action of heat and pressure, with the aid of zinc oxide as catalyst, the formation of methyl alcohol taking place, as is believed, via intermediate formation of formaldehyde which is converted into methyl alcohol by splitting off carbon monoxide.
- The object of the present invention is to produce keten from mixtures of or containing hydrogen and carbon monoxide by combination of these gases under heat and pressure in presence of catalysts.
- For this purpose I employ the carbon monoxide and hydrogen in about the relative proportions necessary to satisfy the chemical equation, namely about three molecules of carbon monoxide to one molecule of hydrogen ($3CO + H_2 = CO_2 + CH_3CO$), it being understood that I do not confine myself closely to these relative proportions of carbon monoxide and hydrogen.
- For the purpose of the reaction I use catalysts or mixtures of catalysts capable of effecting the combination of the gases to form methyl alcohol or other oxygenated organic compounds, such for example as zinc oxide, copper oxide, copper chromate, zinc chromate, zinc aluminates, potassium zincate or their mixtures of two together or several together; zinc oxide with potassium acetate or potassium carbonate; or zinc oxide with aluminium; copper or zinc or tin with potassium carbonate or sodium carbonate or their corresponding acetates; or even caustic alkali combined with zinc oxide or copper oxide. These catalysts are only enumerated by way of example, without being limitative, as other catalysts or catalyst mixtures of the kind indicated may be employed, be it in the form of metals or their salts or mixtures of metals and their salts, especially salts of the type of chromates, vanadates, etc., preferably when a catalyst of basic nature and preferably relatively strong basic nature is present.
- In carrying out the process one may employ similar conditions of temperature and pressure etc. to those indicated for the production of methyl alcohol in my said other specification, for example temperatures below about 400° – 450° C., and preferably between about 200° and 300° C., and pressures which may be up to 200 atmospheres or more, variable according to the catalysts used, but generally pressures of about 50 to 150 atmospheres.
- Catalysts favouring the production of methane or more than traces of methane should be avoided.
- In executing the process of the present invention the speed of passage of the gases has also an influence, as, if

they are passed through the apparatus at relatively low speed, hydrocarbons and higher alcohols may be formed.

The invention may be performed in the manner illustrated in the following example, but is not limited thereto.

EXAMPLE.

A mixture containing about 3 parts by volume of carbon monoxide to 1 part by volume of hydrogen is passed under a pressure of about 120 atmospheres over a granular mass of zinc oxide maintained at a temperature of about 260–270° C. The resulting keten-containing gas is collected, and may be used directly without separation of the keten for the production of acetic acid or acetic anhydride or other bodies derivable from keten, or the keten may be separated by cooling and liquefaction.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Process for the manufacture of keten, characterised in that mixtures of or containing carbon monoxide and hydrogen in the relative proportions of about three molecules of carbon monoxide to one molecule of hydrogen are subjected to heat and pressure in presence of catalysts (other than catalysts favouring the production of methane or the production of more than traces of methane) capable of effecting combination of the gases to produce methyl alcohol or other oxygenated organic compounds.

2. Process according to Claim 1, characterised by the employment of one or more of the following substances or

mixtures of substances as catalysts; zinc oxide, copper oxide, copper chromate, zinc chromate, zinc aluminates, potassium zincate, or their mixtures of two or several together; zinc oxide with potassium acetate or potassium carbonate; zinc oxide with aluminium; copper or zinc or tin with potassium carbonate or sodium carbonate or their corresponding acetates; caustic alkali combined with zinc oxide or copper oxide; or metals or metal salts capable of effecting the combination of carbon monoxide and hydrogen to form methyl alcohol or mixtures of said metals and salts, and especially salts of the type of chromates, vanadates, etc., preferably when a catalyst of basic nature and preferably relatively strong basic nature is present.

3. Process according to Claim 1 or 2, characterised in that the reaction is performed at temperatures below about 400° to 450° C. and preferably between temperatures of about 200 to 300° C.

4. Process according to Claim 1, 2 or 3, characterised in that the reaction is performed under pressures of up to 200 atmospheres or more and preferably under pressures of from about 50 to 150 atmospheres.

5. Process for the manufacture of keten from carbon monoxide and hydrogen substantially as described.

6. Keten when prepared or produced by the processes herein described and claimed.

Dated this 12th day of April, 1926.

T. L. WHITEHEAD,
Chartered Patent Agent,
Patent Department,
British Celanese Ltd.,

8, Waterloo Place, London, S.W. 1.

ND