Production of Bio Petrol (or) ISO-Octane from Cane Sugar

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Abstract— Petroleum at atmospheric pressure and temperature comprises both crude oil and natural gas. Crude oils are predominantly made up of higher carbon atom numbers (C5+) and are liquids at room temperature and pressure. Because the reservoirs are at considerable depth the hydro carbons are contained at elevated pressure (2to1, 300barg) and temperature (25to180°C) and can therefore be in a gaseous or liquid state. However, due to its volume, natural gas requires more complex infrastructure for transport, which for remote locations can be uneconomic and hence natural gas associated with crude oil is either burned as a waste gas or re-injected to maintain reservoir pressure. Glucose and Fructose is obtained in laboratory by hydrolysis of cane - sugar. We can produce bio petrol from cane sugar. It can change the economics of the world. The products from petroleum contain circa 50% more energy per unit mass than coal, in other words, 1.5tones of coal is equivalent to one tone of oil. However, as demand for gas has increased in major developed market store duce carbon dioxide emissions, there has been an increase in the quantity of natural gas which is Liquefied at temperatures down to-162° C in order to transport it as a liquid-liquefied natural gas (LNG). In 2009 approximately 244 billion cubic meter so LNG was traded.

Key words: Bio Petrol, Hydrolysis Process, Sorbitol, Asymmetric Carbon Atom, Isooctane

I. INTRODUCTION

Petroleum is a naturally occurring raw material ,consisting mainly of hydro carbons ,and found in Accumulations in porous reservoir rocks underground .Hydrocarbons are molecules comprising carbon and hydrogen atoms which range from methane(CH4) to substances containing more than 100 carbon atoms. Petroleum at atmospheric pressure and temperature comprises both crude oil and natural gas. Natural gas is gaseous at room temperature and pressure, consisting mainly of hydrocarbons with few carbon atoms up to butane (C4H10). Crude oils are predominantly made up of higher carbon atom numbers (C5+) and are liquids at room temperature and pressure. Because the reservoirs are at considerable depth the hydro carbons are contained at elevated pressure (2to1, 300barg) and temperature (25to180°C) and can therefore be in a gaseous or liquid state.

When petroleum is produced from reservoirs it will often have associated non-hydro carbons, such as nitrogen, carbon dioxide, sulfur, hydrogen sulfide, metals and water. Therefore, processing is normally required before it can be used to produce usable fuels or derivative products. Oil and gas from the reservoir is usually processed close to the point of production to remove undesirable hydro carbons and the non-hydro carbon contaminants in order to meet a specification suitable for transportation and onward sales. Natural gas at this point is often ready to be used directly as a fuel, whereas, crude oil will need further refining.

Petroleum accumulations are located across the globe and often the larger reservoirs are in regions remote from areas of high demand. Crude oil can be readily transported in liquid form from its source to the point of use by pipe line and /or sea-going tankers. However, due to its volume, natural gas requires more complex infrastructure for transport, which for remote locations can be uneconomic and hence natural gas associated with crude oil is either burned as a waste gas or re-injected to maintain reservoir pressure.

II. GLOBAL SUPPLY AND DEMAND

The products from petroleum contain circa 50% more energy per unit mass than coal, in other words, 1.5tones of coal is equivalent to one tone of oil. This relatively high "energy density" coupled with the relative ease of handling liquids and gases is one of them a in reasons why petroleum (oil and natural gas) is utilized to generate a large proportion of the world's energy needs (~60% in 2009) as primary energy.

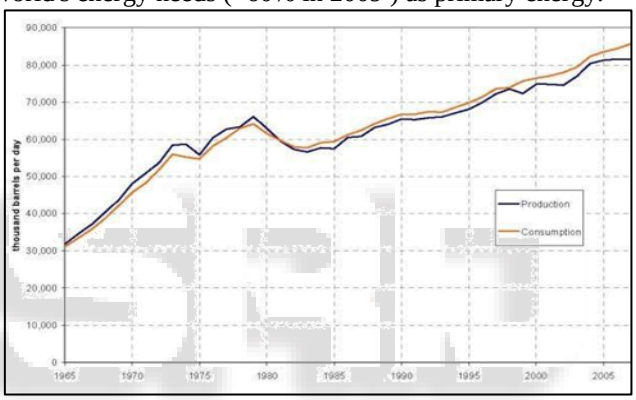


Fig. 1: Historical Oil Production and Consumption

Figure 1 illustrate show demand for petroleum increased throughout the 20th Century with major growth occurring between 1965 and 1978 after which demand fell for several years before resuming gas lower rate of increase through to the end of the 20th Century. This trend has continued in the first ten years of the 21st Century, although the global recession in 2009 has caused the first overall decline since 1982.

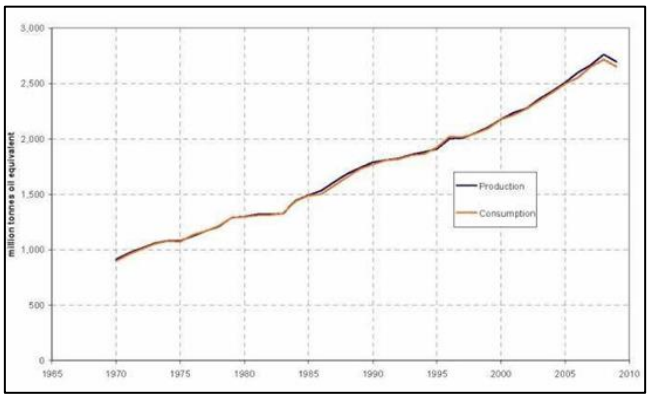


Fig. 2: Historical Gas Production and Consumption

Figure 2 shows similar overall growth in demand and consumption of natural gas, however, whilst the growth rate in oil consumption has slowed, natural gas demand has grown at an increasing rate for the first ten years of the 21st

Century. Natural gas produces less carbon dioxide per unit mass consumed when compared to liquid petroleum products and coal, hence, natural gas has displaced liquid petroleum based fuels and coal in efforts to reduce the amount of carbon dioxide generated in meeting energy needs.

It is one of the quirks of nature that the petroleum is deposited in areas remote from the major centers of development across the globe. This has given rise to an industry that is truly global in reach and scale with oil being the largest internationally traded commodity by whatever measure is chosen (volume or monetary value).

This imbalance in supply and demand is illustrated for oil in Figure 3 below:

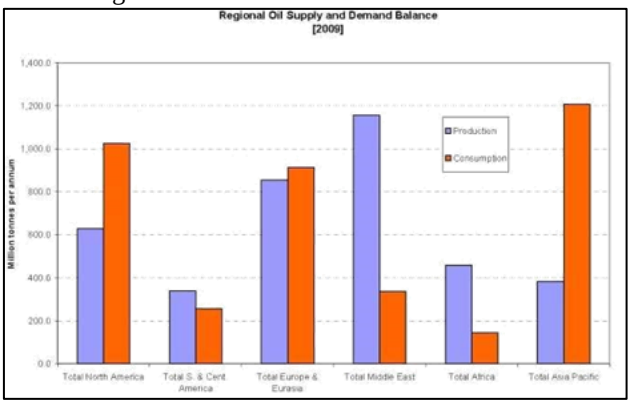


Fig. 3: Regional Oil Supply and Demand

Due to the difficulties in storing and transporting gas over long distances there is less of a regional imbalance for natural gas as illustrated in Figure 4.

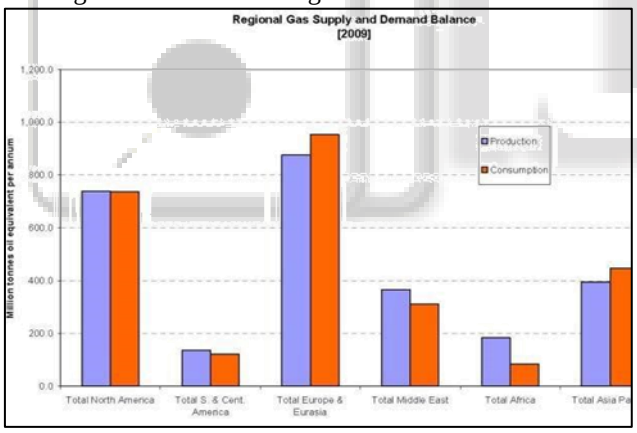


Fig. 4: Regional Gas Supply and Demand

However, as demand for gas has increased in major developed market store duce carbon dioxide emissions, there has been an increase in the quantity of natural gas which is Liquefied at temperatures down to-162° C in order to transport it as a liquid-liquefied natural gas (LNG).

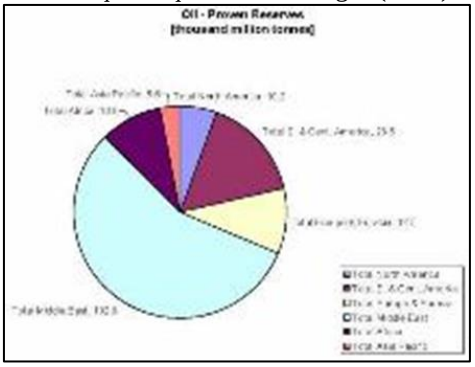


Fig. 5: Oil- Proven Reserves

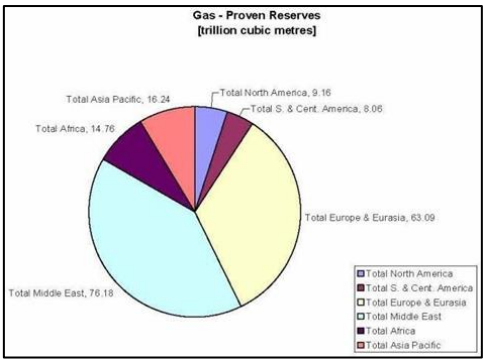


Fig. 6: Proven Gas Reserves

In 2009 approximately 244 billion cubic meter so LNG was traded, Proven reserves for oil and gas as of 2009 which remain to be produced are shown in Figure 5 and Figure 6 below:

III. PROCESS

Glucose and Fructose is obtained in laboratory by hydrolysis of cane – sugar.

$$\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11} + H_2O} \xrightarrow{H_2SO_4} \underset{\text{Glucose}}{C_6H_{12}O_6} + \underset{\text{Fructose}}{C_6H_{12}O_6}$$

A solution of cane –sugar is boiled with dilute sulfuric acid till the hydrolysis is complete. The excess of sulfuric acid is neutralized by adding milk of lime. A little more milk of lime is added which converts glucose and fructose into calcium glucosate and calcium fructosate respectively. Calcium fructosate being soluble precipitates and separates out whereas calcium glucosate remains in solution. Calcium fructosate and Calcium glucosate is filtered off and suspended in water through which carbon dioxide is passed. Carbon dioxide decomposes calcium fructosate into fructose and Calcium glucosate into glucose and calcium carbonate.

$$\underset{\text{Calcium fructosate}}{C_6H_{11}O_5OCaOH + CO_2} \longrightarrow \underset{\text{Fructose}}{C_6H_{12}O_6} + CaCO_3$$

Calcium carbonate is filtered off and the solution is concentrated in vacuum and crystallized by adding a few crystals of fructose and glucose.

IV. REACTIONS

When reduced by sodium amalgam in aqueous solution mono saccharides yield poly hydroxy alcohols. Glucose when reduced gives D-glucitol or sorbitol, a hexa hydric alcohol.

$$\underset{\text{Glucose}}{CH_2OH.(CHOH)_4CHO + 2H} \xrightarrow{\text{Na-amalgam Or } NaBH_4} \underset{\text{Sorbitol}}{CH_2OH(CHOH)_4CH_2OH}$$

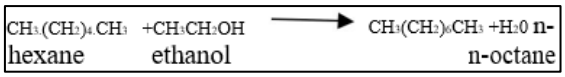
Fructose, however gives a mixture of sorbitol and mannitol because the reduction of >C=O group in fructose introduces a new asymmetric carbon atom.

$$\underset{\text{Fructose}}{CH_2OH(CHOH)_3COCH_2OH + 2H} \longrightarrow \underset{\text{Sorbitol and Mannitol}}{CH_2OH.(CHOH)_3CHOH.CH_2OH}$$

Heating with hydro iodic acid and red phosphorus at 100 C produces 2-iodo hexane. However prolonged heating finally gives n-hexane.

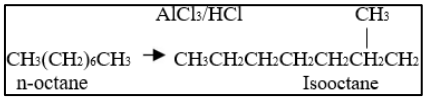
$$\underset{\text{Sorbitol}}{CH_2OH.(CHOH)_4.CHOH} \xrightarrow{HI} \underset{\text{n-hexane`}}{CH_3(CH_2)_4.CH_3}$$

Heating with alcohol groups at 100 C produces a long chain hydro carbons compound (n-octane) and remove water.



A. Isomerization Process

The process of conversion of a compound into its isomer is known as isomerizations. Straight chain alkanes, when heated in presence of anhydrous aluminium chloride and hydrochloric acid at about 200 C under a pressure of 35 atmospheres are converted to their branched chain isomers.



V. CONCULUSION

Finally we can produce the Isooctane or synthetic petrol or bio petrol from cane sugar .The cost of synthetic petrol is low compared with refinery process .based on this process production of isooctane petrol is very pure and it does not need any modification of vehicles.

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