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## **1 Abstract:**

Production of a biofuel for jet engines is a priority research topic. Construction of similar chemical composition as that of the existing jet fuels is of absolute requirement. A similar production technique of producing the bio jet fuel from various polysaccharide sources is possible to be carried on to obtain required paraffin composition to substitute the JP 8 jet fuel by typical reaction procedure.

Hydrolysis of polysaccharide to form disaccharides which are then processed through de-esterification chamber to form sugars which can be treated to form fattyacids and thus paraffins of required composition after reduction, decarboxylation and anaerobic pyrolysis is the suggested reaction procedure. This reaction procedure can be observed to be carried out with out any metabolism involved which encourages the pace of reaction and thus the economical viability of the process for long time existence.

## **2 Introduction:**

Jet engines are well known that they are the engines which posses the combustion chamber and produces thrust purely due to the pressurization of flue gases at the exit with the help of a nozzle. It is also known that any hydrocarbon fuel can serve the purpose of a jet fuel where fuel is literally burned and the escaping flue is utilized for the thrust. But as we know, the matter of fact which decides the fuel priorities can be discussed on the basis octane numbers which depicts the knocking property of fuel, calorific value/ internal energy which shows the energy density of the fuel and through variations in added substituent for favorable physical and combustibile properties. There are few constituent compounds we substitute to the basic complex composition so as to observe higher commercial use. That is how we have categorized the

jet-fuels into varieties and we are now using few of them by setting priorities to their physical nature besides fuel value. They involve freezing temperature as main issue.

Bio-fuels are a very well concept of fuels which are naturally obtained. These are the fuels we substitute for the petrochemicals so as to obtain the renewable energy resource for commercial use. However, these have been processed for thermodynamic cycles like Otto cycle, diesel cycle etc., and are stabilized as the sources for automotive fuels only. Research on obtaining a higher octane rated fuel is still going on and different blends, composition are introduced with the conventional bio-fuel to obtain desired output. In this regard, it is also a very interesting research area to obtain a biofuel for aviation industries. Research on application of conventional biofuel to conventional aviation industry further extended to the idea of application of biofuel for jet engines.

This triggered for an idea of establishing a natural blend between the conventional refined petrochemical jetfuel and the biofuel. This blend came to its successful mission in 2007 by green flight and further by many other organizations.

This paper mainly deals with the proposed procedure for obtaining an absolute biofuel for jet engines which posses similar octane ratings as jet fuel JP-8 and posses similar physical and chemical properties as of it. Production procedure is also commented as non bacterial to suggest the non enzyme activity so as to make it most viable economically, thus impressing the aviation industries.

### **3 Chemical analysis of natural jetfuel:**

It is an observed fact that the jetfuel obtained by refining the petroleum chemicals contains a typical chemical composition with iso-octane, cyclo-octane, n-octane as main 8 carbon compounds, decane, hexa-decane, do-decane, tetro-decane and other composition traces. Thus it can be inferred that a high octane numbered jetfuel with 150+ octane rating contains mainly a 8,10, 14 and 16 carbon aliphatic open chain organic compound which are generally saturated. These saturated carbons since are a well established basic components of organic chemistry, they really donot possess absolute requirement for a biocatalyst. This inference can be exploited for maximum use by producing the required substitute composition from a very basic hydrocarbon resource such as corn, etc.

### **4 Ideal feedstock:**

It was proposed by me in few prior papers of similar art that cellulose content from cotton can be cracked down to useful monosaccarides and thus to obtain natural alcohols and biofuels. But, since the expenses on aviation fuels and motor vehicles is of absolute contrast, we can consider for a better feedstock for obtaining the desired biofuel for jet engines. So, we can consider the selection of corn, molasses, jatopha, switch grass and other crops for this production plant as natural resources. Since there is no need for a microbial culture, it is a fact that the reaction is fast enough and this enables a better balance sheet.

### **5 Production procedure:**

Cellulose/ hemicelluloses/ starch extracts are exploited for their chemical composition. They are the best available polysaccharide sources that are ever recognized. These polysaccharides can be processed so as to obtain disaccharide compounds such as sucrose, cellubiose and lactose by catalytic hydrolyzing. This hydrolysis reaction is generally known to be supported by the ionic medium. It was observed that the reaction is showing brilliant pace when it is carried out in presence of a ionic medium produced from a coordinate compound. This can be inferred from the fact that coordinate molecules undergo ionization to form bigger ions that generally

stimulate the field more than that of a natural ions of a salt. This disaccharide compounds are then processed for de-esterification process where the polysaccharides are reacted to form monosaccharide sugars and compounds such as glucose, fructose etc. A very important concept that can be appreciated is that the disaccharide compounds we have generated and re-treated can be obtained from molasses. This sideway reaction is also another possible feedstock to product reaction. Similarly, the monosaccharide compounds can be obtained from any glucose sources. Thus the sugar formation is estimated. Formed sugars can then be processed for catalytic reduction to form fattyacids. These carboxylic group compounds can also be obtained from jatropaha seed oil which is currently tagged as a biodiesel in market. The obtained fatty acids can then be converted to paraffin by decarboxilation and then can be converted to the required composition as of JP8 by anaerobic pyrolysis. Thus a probable reaction starting from class 2 graded hemicelluloses to a very refined biofuel with an average octane rating of 150 and an attractive flash point can be obtained.

### **6 Technical interests in reaction procedure:**

It is known fact that obtaining absolute biofuel for jet engines is of absolute interest now. Obtaining it from various HC resources is a most desirable characteristic that is aimed at every reaction procedure designed so as to obtain bio jet fuel. This is a significant style of this reaction process. The process flow sheet is so designed so as to obtain products at batch/ continuous process and the commercial requirements can set the mode and way of preparation techniques.

Talking about the economics behind this production, we know that a biofuel is always preferable for its almost constant price unlike that of the petroleum fuels which fluctuate with global political admonishes. More over, such a reaction where feedstock is selectable is most desired for shifting of feedstock depending upon the economical requirements. This production procedure can be further classified at better edge when compared to that of use of a jatropaha oil for jet engines for its higher octane rating and impressive flash point. Use

of jatropha oil solely as a jetfuel is never possible commercially. Similarly the blend we make between this oil and standard JP8. Thus, an exact reconstruction of similar chemical composition as that of JP8 from natural source carbon is next priority for us to work on and I feel this paper paces us in production techniques.

## 7 Economical interests:

It is known that any hemicelluloses source can be utilized for this reaction as feedstock. Similarly, molasses can also be used as second option for the feedstock selection. Since the reaction is carried out in laboratorial conditions with out a use of fermentation, it can be inferred as economically viable. The fermentation metabolism is a very time consuming reaction and it demands for loss on interest on capital investment. This can be controlled and thus can be maintained at priority economically when compared with that of blends or absolute compositions from fermenting races such as algae etc. Feedstock proposed are at a very decent fare available in excess in the tropical countries such as India. Thus, utilizing natural sources of low cost and processing it with most economically viable process promises the extensive utilization of the technology in the future generations of bio jet fuel industries.

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