Production of Industrial Alcohols

(Grain Motor Fuel Alcohol, Alcohols, Higher Aliphatic, Alcohol from Wheat Straw, Monohydrich Alcohols, Trihydric and Polyhydric Alcohols, Methanol from Coal, Heptahydrich Alcohols, Perseitol, Volemitol, Allitol, Dulcitol, Erythritol, Leaf Alcohol, Hexynol, Methyl Pentynol)
Production of industrial alcohol is an age old practice. But with time, the usage areas as well as production techniques have gone through a major transformation. Industrial alcohol is distilled ethyl alcohol (C2H5OH), normally of high proof, produced and sold for other than beverage purposes. It is usually distributed in the form of pure ethyl alcohol, completely denatured alcohol, especially denatured alcohol and proprietary solvent blends. Ethyl Alcohol is the common name for the hydroxyl derivative of the hydrocarbon ethane.
Industrial alcohol is distilled ethyl alcohol normally of high proof, produced and sold for other than beverage purposes. Industrial alcohol finds its applications in many chemical industries, pharmaceutical industries, Ink Industries and various allied applications. Much of this alcohol is obtained synthetically from ethylene. However, its production from microbial fermentation using variety of cheap sugary substrates is still commercially important. The various substrates used for ethanol production are sugar crops such as sugarcane, sugar beet, sorghum, etc. provide a good substrate.
Bye product of these crop processing, e.g., molasses, sweet sorghum syrup, etc. are the most common substrates. Cereals like maize, wheat, rice etc are also used for ethanol production. Distillation of industrial alcohol, which is normally not used for consumption, can be made in a two-step process. The process of distillation is one with a slow dynamics making it essential to have a carefully planned and designed control system. Ethyl alcohol or ethanol ranks second only to water as the most widely used solvent in chemical industry and as these industries have expanded, so the demand for industrial alcohol has increased.
Market Outlook

The industrial alcohol market is estimated to be valued at USD 113.26 Billion in 2017, and is projected to grow at a CAGR of 9.8% during the forecast period of 2017 to 2022.
Industrial Alcohol Market

- Asia-Pacific
- South America
- North America
- Europe
- RoW

CAGR (2017-2022)

Market Size in 2022
Sugar Alcohols is forecast to be 1.6 million metric tons in 2017 and is projected to reach 1.9 million metric tons by 2022 at a CAGR of 3.4% between the two years.

The industrial alcohol market is projected to grow at a CAGR of 9.8% from 2017, to reach USD 180.83 billion by 2022.
The ethyl alcohol segment is estimated to account for the largest market share in the Industrial Alcohol Market in 2017, due to its wide range of applications in the biofuel industry. Ethyl alcohol is considered as the most widely used industrial alcohol, owing to their multi-functional properties and their vast applications in the biofuel, pharmaceutical, personal care, food ingredients, and chemical industries.
## Demand of Methanol

### Demand: Past and Future

<table>
<thead>
<tr>
<th>Year</th>
<th>(In '000 Metric Tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-91</td>
<td>190</td>
</tr>
<tr>
<td>2000-01</td>
<td>516</td>
</tr>
<tr>
<td>2001-02</td>
<td>695</td>
</tr>
<tr>
<td>2002-03</td>
<td>673</td>
</tr>
<tr>
<td>2003-04</td>
<td>844</td>
</tr>
<tr>
<td>2004-05</td>
<td>776</td>
</tr>
<tr>
<td>2005-06</td>
<td>838</td>
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<td>2007-08</td>
<td>933</td>
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<td>1795</td>
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<tr>
<td>2018-19</td>
<td>1850</td>
</tr>
<tr>
<td>2019-20</td>
<td>1935</td>
</tr>
<tr>
<td>2024-25</td>
<td>2575</td>
</tr>
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</table>
### Market Growth Rates of Methanol

<table>
<thead>
<tr>
<th>Period</th>
<th>Market Growth Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-91-2000-01</td>
<td>10.5%</td>
</tr>
<tr>
<td>2000-01-2005-06</td>
<td>10.1%</td>
</tr>
<tr>
<td>2005-06-2010-11</td>
<td>7.5%</td>
</tr>
<tr>
<td>2010-11-2019-20</td>
<td>5.4%</td>
</tr>
<tr>
<td>2019-20-2024-25</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

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1. ALCOHOL FROM CORN

Base Case Production of Alcohol, Overall Material and Energy Flows, Grain Motor Fuel Alcohol Plant, Excursions on Feedstock Material, Sensitivity to Financial Parameters, Depreciation Schedule, Purchase Price of Corn, DOG By-product, Leveraged Capital, Investment Tax Credit, Background and Job Scope, Design Basis, Base Case, Excursions, Plant Capacity, Nature of Raw Material For Process, Corn Stover (Biomass) as Primary Boiler Fuel, Corn Processing By-products, Production of Motor Fuel Grade Alcohol, Base Case, Process Description, Receiving, Storage and Milling, Mash Cooking and Saccharification, Fungal Amylase Production,
Fermentation (Batch), Distillation, Fusel Oil and Heads Removal, Evaporation and Drying of Stilage Residue, Alcohol Storage and Shipping, Ammonium Sulfate Storage and Shipping, Dry Grains Storage and Shipping, Coal Fired Boiler, Water Supply, Waste Water Treatment, Flue Gas Scrubber, 100 mm Gallon per year Alcohol Plant, Fixed Investment, Excursions on Feedstock Materials, Wheat, Process Description, Milo (Grain Sorghum), Process Description, Sweet Sorghum, Process Description, Environmental Impact, Air Emissions, Waste Water, Solid Waste, Noise, Labor and Employment Impact, Agricultural Production, Plant Labour, Agricultural Impact, Subsidies and Land Use, Improved Farm Income, Grain Supply and Price, Comments on Developing Technology, Grain Production, Grain Processing, Fermentation, Distillation, Animal Feed Processing, Cellulose Alcohol Development, U.S. Army-Natick Laboratories, University of California of Berkeley (Wilke), University of Pennsylvania (Humphrey) and General Electric Company,
2. ALCOHOLS, HIGHER ALIPHATIC

3. ALCOHOL FROM WHEAT STRAW

Introduction, Summary and Conclusions, Process Description, Process Discussion, Cost Estimates, Batch Process Technology in Indian Distilleries, Definitions, Molasses, Total Reducing Sugars, Unfermentable Sugars, Fermentable Sugars, Brix, Polarisation (Pol.), Purity, Alcohol, Spirit's, Wort, Pitch or Bub, Wash, Sludge, Sediment, Reflux, Spent Wash, Proof Spirit, Calculation of Efficiency Data, Alcohol Production Processes, Synthetic Process, Alcohol from Starchy Materials (Grain Spirit), Scenario, Potential of Grain as Raw Material, Process Description, Raw Material Preparation, Liquefaction, Yeast Cultivation & Prefermentation, Saccharification & Fermentation, Alcohol from Sacchariferous Feed Stocks, Conventional Process Used in Indian Distilleries, Fermentation, Distillation, Continuous Rectification and Reflux Ratio, Alcohol Recovery, Quality of Alcohol, Steam Economy, Fusel Oil Separation, Absolute Alcohol
4. MONOHYDRIC ALCOHOLS

Diisobutyl-carbinol, Behenyl Alcohol, Lignoceryl Alcohol, Ceryl Alcohol, Montanyl Alcohol, Myricyl Alcohol, Melissyl Alcohol, Lacceryl Alcohol, Geddyl Alcohol, Unsaturated Acyclic (Aliphatic) Alcohols, Introduction, Health and Safety Factors, Uses, Unsaturated Alcohols, Vinyl Alcohol, Allyl Alcohol, Propargyl Alcohol, Crotyl Alcohol, Methylallyl Alcohol, Propargylcarbinol, Allylethyl Alcohol, 1-Penten-3-ol, 1-Pentyn-3-ol, Methyl Butynol, Reactions of the Hydroxyl Group, Reactions of the Triple Bond, Reactions of the Acetylenic Hydrogen, Reactions of the Hydroxyl Group and Triple Bond, 1-Hexen-3-ol, Leaf Alcohol, Hexynol, Methyl Pentynol, 4-Methyl-1-pentyn-3-ol, 1-Octen-3-ol, 2-Octynol, Ethyl Octynol, Oleyl Alcohol, Citronellol, Geraniol, Linalool, Analogs and Derivatives of Alcohols, Analogs, Derivatives, Oxidation Products, Alicyclic Alcohols, Introduction, Cyclopropanol, Cyclobutanol, Cyclopentanol,
Cyclohexanol, Ethynyl Cyclohexanol, Menthol, α-Terpineol, Borneol, Cholesterol, Ergosterol, Fenchyl Alcohol, Physical Properties, Chemical Properties, Araliphatic Alcohols, Benzyl Alcohol, β-Phenylethyl Alcohol, Styralyl Alcohol, Hydrocinnamyl Alcohol, Benzhydrol, Triphenylmethanol, Cinnamyl Alcohol, Cumaryl Alcohol, Salicyl Alcohol, Phenylpropargyl Alcohol, Heterocyclic Alcohols, Furfuryl Alcohol, Tetrahydrofurfuryl Alcohol, Thenyl Alcohol, Hydroxymethylpyrrole
5. TRIHYDRIC AND POLYHYDRIC ALCOHOLS

Trihydric Aliphatic Alcohols (Glycerols), General, Preparation, Properties, Uses, Glycerol, Occurrence, Production, Physical Properties, Grades of glycerin, Specific Gravity, Epoxy Compounds, Esters, 1,2,4-Butanetriol, Pentaglycerol, Hexaglycerol, 1,2,6-Hexanetriol, Higher Polyhydric Aliphatic Alcohols, Chemical Properties, Toxicological Properties, Uses, General, Physical Properties, Tetrahydric Alcohols (Tetritols), CH2OH(CHOH)2 CH2OH, Erythritol, d- and l-Threitol, dl-Threitol, Pentaerythritol, Pentahydric Alcohols (Pentitols), Ribitol, Xylitol, Preparation, d-Arabitol, l-Arabitol, dl-Arabitol, Hexahydric Alcohols (Hexitols), Allitol, Dulcitol, Sorbitol, Chemical Properties, Toxicity and Uses, l-Glucitol, d-Mannitol, l-Mannitol, Physical Properties, Chemical Properties, Toxicity and Uses, dl-Mannitol, d-Iditol, l-Iditol, d-Talitol, l-Talitol, dl-Talitol, Inositol, Heptahydric Alcohols (Heptitols), Perseitol, Volemitol, Glycero-gulo-Heptitol and D-glycero-D-idoo-Heptitol, Octahydric Alcohols (Octitols), Polyvinyl Alcohol
6. METHANOL FROM COAL

Niir Project Consultancy Services (NPCS) can provide Process Technology Book on

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- Activated Carbon & Activated Charcoal
- Aluminium And Aluminium Extrusion Profiles & Sections,
- Bio-fertilizers And Biotechnology
- Breakfast Snacks And Cereal Food
- Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling
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- Chemicals (Organic And Inorganic)
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- Cereal Processing
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- Cold Storage For Fruits & Vegetables
- Coal & Coal Byproduct
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- Engineering Goods
- Fibre Glass & Float Glass
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- Hospital Based Projects
- Herbal Based Projects
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