Cashew Nut Shell Oil Production.

Manufacturing of Cashew Nut Shell Liquid or CNSL or Cashew Shell Oil or CNSL Oil
CASHEW NUT SHELL LIQUID or CNSL or Cashew Nut Oil or Cashew Shell Oil or CNSL Oil is a versatile by product of the Cashew industry. The nut has a shell of about 1/8 inch thickness inside which is a soft honey comb structure containing a dark reddish brown viscous liquid. It is called CASHEW NUT SHELL LIQUID or CNSL. Which is the pericarp fluid of the Cashew Nut. It is often considered as the better and cheaper material for unsaturated phenols.
CNSL has innumerable applications, such as friction linings, paints, laminating resins, rubber compounding resins, cashew cements, polyurethane based polymers, surfactants, epoxy resins, foundry chemicals, and intermediates for chemical industry. It offers much scope and varied opportunities for the development of other tailor-made polymers.
Cashew Nut Shell Liquid undergoes all the conventional reactions of phenols, CNSL aldehyde condensation products and CNSL based phenolic resins are used in applications such as surface coatings, adhesives. Various polyamines synthesized from CNSL are used as curing agents for epoxy resins. CNSL and its derivatives have been used as antioxidants, plasticizers and processing aids for rubber compounds, modifiers for plastic materials and used to provide oxidative resistance sulphur-cured natural rubber products. It is also added to rubber gum stock or nit rile rubber to improve the processability, mechanical properties and resistance to crack and cut properties of the vulcanisates.
CNSL has innumerable applications in polymer based industries such as friction linings, paints and varnishes, laminating resins, rubber compounding resins, cashew cements, polyurethane based polymers, surfactants, epoxy resins, foundry chemicals and intermediates for chemical industry. It offers much scope and varied opportunities for the development of other tailor-made polymers.

Raw Cashew nut shell contains over 20% CNSL. In the oil bath process about 10% of oil is recovered as a by-product. By using expellers for extraction, it is possible to extract a further quantity of about 10% more from the shells. Thus from 1 tonne of shells using oil bath process, upto 100 Kg of good quality of CNSL could be extracted by using oil expellers. It is advisable that a small unit of the size given below for extraction and recovery of CNSL is set up adjacent to each good cashew processing unit in view of the economic importance and ready foreign as well as internal demand of the product.
<table>
<thead>
<tr>
<th>Application</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Coating</td>
<td>CNSL based surface coatings possess excellent gloss and surface finish with optimum levels of toughness and elasticity. It is widely known that CNSL resin is added to synthetics by paint/varnish manufacturers to control properties and to reduce cost. It’s anti-microbial, acid resistant and rust proof properties are well known and have been utilized in protecting a bottom of the boat hulls. Because of its dark color, its outlets are restricted to anti corrosion primers, black enamels, and marine paints.</td>
</tr>
<tr>
<td>Enamel/Paints</td>
<td>CNSL is an excellent raw material for the number of anti-corrosive paint formulations</td>
</tr>
<tr>
<td>Marine Paints</td>
<td>CNSL modified by heating in the presence of certain accelerators give stoving enamels resistant to alkali and acid solutions, mineral and fatty oils and various organic solvents.</td>
</tr>
<tr>
<td>Acid resistant Paints</td>
<td>Coating compositions possessing insecticidal properties are obtained by adding DDT, gammexane, etc. to CNSL or chlorinated CNSL, after treatment with formaldehyde, gums and resins and drying or semi-drying oils</td>
</tr>
<tr>
<td>Binders</td>
<td>CNSL is also used as a substitute for linseed oil in the manufacture of foundry core oil, which is used as a binder in the foundry.</td>
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<tr>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Rubber</td>
<td>Used as a processing aid, which enhances the vulcanization properties. CNSL enhances the insolubility of natural rubber vulcanizates in petroleum solvents.</td>
</tr>
<tr>
<td></td>
<td>CNSL used to provide oxidative resistance to sulfur-cured natural rubber products.</td>
</tr>
<tr>
<td></td>
<td>Sulfurated CNSL is added to rubber gum stock or nitrile rubber to improve the processability, mechanical properties and resistance to crack and cut</td>
</tr>
<tr>
<td>Adhesive</td>
<td>Adhesives suitable for plywood are made by oxidizing CNSL with potassium permanganate or manganese dioxide at 100degC reacted with para-formaldehyde and compounded with CuCl2.</td>
</tr>
<tr>
<td></td>
<td>Also CNSL modified with furfural, aniline, xylol, etc. gives good plywood adhesives.</td>
</tr>
<tr>
<td>CNSL Based Resins</td>
<td>It is highly suitable for surface coating application, where outstanding film properties and very high resistance to water and chemicals are required.</td>
</tr>
</tbody>
</table>
- Therefore, CNSL Resin is used commonly as a paint raw material due to its high water and chemical resistant property

<table>
<thead>
<tr>
<th>CNSL Formaldehyde Resins (Novolac)</th>
<th>These resins can be used for Surface Coatings with or without oil modification when high chemical resistance is desired</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNSL Aldehyde Resin</td>
<td>Excellent material for the purposes like Insulating Varnishes, Molding Powders, Brake Lining Compositions, etc.</td>
</tr>
<tr>
<td>Resole type CNSL formaldehyde resin</td>
<td>Resole type CNSL formaldehyde resin is used as adhesive in the preparation of composite wood, medium density particle board etc.</td>
</tr>
<tr>
<td>Foundry Resins</td>
<td>Proven material in the formation of foundry cores</td>
</tr>
<tr>
<td>Rubber Compounding Resins</td>
<td>Incorporation of CNSL products in rubber improves tensile strength and abrasion resistance, reduces fatigue, enhances self-adhesion, rubber to cord adhesion, and contributes to antioxidant and antiozonant activity. The fast curing cashew modified phenol-formaldehyde resins enhance the resistance of the product to aging, chemical attack and the action of solvents and acids</td>
</tr>
</tbody>
</table>
Cashew-Nut Shell Liquid Oil (CNSL) is an important by-product of cashew. India’s Cashew-Nut Shell Liquid Oil Export Market: Along with quality cashew kernel, Indian cashew nut industry is producing quality Cashew-Nut Shell Liquid oil which is also exportable. Indian cashew nut industry has big market for CNSL. CNSL oil is used in industries hence there is good demand from industrially developed countries. USA and China are the top most importers of Indian Cashew-Nut Shell Liquid oil.

Cashew nut shell liquid oil processing is one of the amazing and latest business ideas which has great market demand as it has many applications.
Cashew Oil or Cashew Nut Shell Oil is a dark reddish brown viscous liquid, extracted from soft honeycomb structure inside the cashew shell.

CNSL has over 200 patents on its industrial applications.

The growth of this sector is expected to be high due to increasing demand in the market, the CNSL oil market is expected to grow with CARG of 7.8% by the year 2022.

Cashew nut shell liquid oil processing business has favorable market potential and great profitability.
KEY MARKETS AND EXPORT DESTINATIONS

- Export of cashew nut shell liquid/Cardanol from India stood at 6,908 MT, valued at Rs 26.28 crore (US$ 4.08 million) during April 2017-December 2017, while exports of cashew kernels stood at 67,653 MT, valued at Rs 4,715.21 crore (US$ 731.15 million) during the same period.

- Export earnings from raw cashew nut during April 2017- October 2017 stood at 3,775 MT worth US$ 6.96 million.

- India accounts for about 65 per cent of global cashew exports.

- India exports cashew kernels to over 60 countries. Its major markets are the US, the Netherlands, Japan, Spain, France, Germany, the UK as well as Middle East countries such as the UAE and Saudi Arabia.
Few Indian major players are as under:

- Golden Cashew Products Pvt. Ltd.
- Kerala State Cashew Devp. Corpn. Ltd.
- Padmavathi Cashews & Coffee Ltd.
- Pratap Cashew Co. Ltd.
Machinery Photographs

Cashew Shell Oil Expeller Machine
Pouch Packing Machine

Chemical Process Tank
### Project at a Glance

#### Project at a Glance

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Existing</th>
<th>Proposed</th>
<th>Total</th>
<th>Particulars</th>
<th>Existing</th>
<th>Proposed</th>
<th>Total</th>
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<td>Land &amp; Site Development Exp.</td>
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<td>21.63</td>
<td>Capital</td>
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<td>65.50</td>
<td>Share Premium</td>
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<td>Plant &amp; Machineries</td>
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<td>24.40</td>
<td>Capital</td>
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<td>Motor Vehicles</td>
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<td>Reserves &amp; Surplus</td>
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<td>Internal Cash Accruals</td>
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<td>Debentures / Bonds</td>
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<td>Provision for Contingencies</td>
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<td>Loans/Deposits</td>
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<td>Margin Money - Working Capital</td>
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<td>12.88</td>
<td></td>
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<td></td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>0.00</td>
<td>159.15</td>
<td>159.15</td>
<td><strong>TOTAL</strong></td>
<td>0.00</td>
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## Project at a Glance

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<th>Year</th>
<th>Annualised</th>
<th>Book Value</th>
<th>Debt</th>
<th>Dividend</th>
<th>Retained Earnings</th>
<th>Payout</th>
<th>Probable Market Price</th>
<th>P/E Ratio</th>
<th>Yield Price/Book Value</th>
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<td></td>
<td>EPS</td>
<td>CEPS</td>
<td>Per Share</td>
<td>Per Share</td>
<td>%</td>
<td>%</td>
<td>No.of Times</td>
<td>%</td>
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<td>1-2</td>
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<td>8.99</td>
<td>15.44</td>
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## Project at a Glance

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<tr>
<th>Year</th>
<th>D. S. C. R.</th>
<th>Debt / Deposits Debt</th>
<th>Equity as- Equity</th>
<th>Total Net Worth</th>
<th>Retun on Net Worth</th>
<th>Profitability Ratio</th>
<th>Asset Turnover Ratio</th>
<th>Current Ratio</th>
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<tr>
<td></td>
<td>Individuall Cumulative</td>
<td>Overall</td>
<td>(Number of times)</td>
<td>(Number of times)</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
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<tr>
<td>Initial</td>
<td>3.00</td>
<td>3.00</td>
<td>11.56</td>
<td>5.95%</td>
<td>3.96%</td>
<td>152.7</td>
<td>27.94</td>
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<td>1-2</td>
<td>1.32</td>
<td>1.32</td>
<td>1.55</td>
<td>1.55</td>
<td>2.66</td>
<td>12.94</td>
<td>8.22%</td>
<td>5.30%</td>
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<td>2-3</td>
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<td>1.48</td>
<td>0.75</td>
<td>0.75</td>
<td>1.57</td>
<td>13.85</td>
<td>9.82%</td>
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<td>3-4</td>
<td>2.04</td>
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<td>2.03</td>
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<td>0.34</td>
<td>0.97</td>
<td>14.46</td>
<td>10.95%</td>
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<td>4-5</td>
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<td>0.63</td>
<td>14.85</td>
<td>11.74%</td>
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<td>Description</td>
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<tr>
<td>-----------------------------------------------------------------</td>
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<tr>
<td>BEP - Maximum Utilisation Year</td>
<td>5</td>
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<tr>
<td>Cash BEP (% of Installed Capacity)</td>
<td>54.12%</td>
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<tr>
<td>Total BEP (% of Installed Capacity)</td>
<td>57.57%</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IRR, PAYBACK and FACR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Rate of Return .. ( In %age )</td>
<td>27.26%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Payback Period of the Project is ( In Years )</td>
<td>2 Years 3 Months</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Assets Coverage Ratio ( No. of times )</td>
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<td></td>
<td></td>
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<td></td>
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</table>
Major Queries/Questions Answered in the Report?

1. **What is Cashew Nut Shell Oil Manufacturing industry?**

2. **How has the Cashew Nut Shell Oil Manufacturing industry performed so far and how will it perform in the coming years?**

3. **What is the Project Feasibility of Cashew Nut Shell Oil Manufacturing Plant?**

4. **What are the requirements of Working Capital for setting up Cashew Nut Shell Oil Manufacturing plant?**
5. What is the structure of the Cashew Nut Shell Oil Manufacturing Business and who are the key/major players?

6. What is the total project cost for setting up Cashew Nut Shell Oil Manufacturing Business?

7. What are the operating costs for setting up Cashew Nut Shell Oil Manufacturing plant?

8. What are the machinery and equipment requirements for setting up Cashew Nut Shell Oil Manufacturing plant?
9. Who are the Suppliers and Manufacturers of Plant & Machinery for setting up Cashew Nut Shell Oil Manufacturing plant?

10. What are the requirements of raw material for setting up Cashew Nut Shell Oil Manufacturing plant?

11. Who are the Suppliers and Manufacturers of Raw materials for setting up Cashew Nut Shell Oil Manufacturing Business?

12. What is the Manufacturing Process of Cashew Nut Shell Oil?
13. What is the total size of land required for setting up Cashew Nut Shell Oil Manufacturing plant?

14. What will be the income and expenditures for Cashew Nut Shell Oil Manufacturing Business?

15. What are the Projected Balance Sheets of Cashew Nut Shell Oil Manufacturing plant?

16. What are the requirement of utilities and overheads for setting up Cashew Nut Shell Oil Manufacturing plant?

17. What is the Built up Area Requirement and cost for setting up Cashew Nut Shell Oil Manufacturing Business?
18. What are the Personnel (Manpower) Requirements for setting up Cashew Nut Shell Oil Manufacturing Business?

19. What are Statistics of Import & Export for Cashew Nut Shell Oil?

20. What is the time required to break-even of Cashew Nut Shell Oil Manufacturing Business?

21. What is the Break-Even Analysis of Cashew Nut Shell Oil Manufacturing plant?

22. What are the Project financials of Cashew Nut Shell Oil Manufacturing Business?
23. What are the Profitability Ratios of Cashew Nut Shell Oil Manufacturing Project?

24. What is the Sensitivity Analysis-Price/Volume of Cashew Nut Shell Oil Manufacturing plant?

25. What are the Projected Pay-Back Period and IRR of Cashew Nut Shell Oil Manufacturing plant?

26. What is the Process Flow Sheet Diagram of Cashew Nut Shell Oil Manufacturing project?
27. What are the Market Opportunities for setting up Cashew Nut Shell Oil Manufacturing plant?

28. What is the Market Study and Assessment for setting up Cashew Nut Shell Oil Manufacturing Business?

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10.7.6. Growth in Income & Expenditure
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- Production Schedule
- Land & Building

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   Factory Land & Building
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- Plant & Machinery
  - Indigenous Machineries
  - Other Machineries (Miscellaneous, Laboratory etc.)

- Other Fixed Assets
  - Furniture & Fixtures
  - Pre-operative and Preliminary Expenses
  - Technical Knowhow
  - Provision of Contingencies

- Working Capital Requirement Per Month
  - Raw Material
  - Packing Material
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