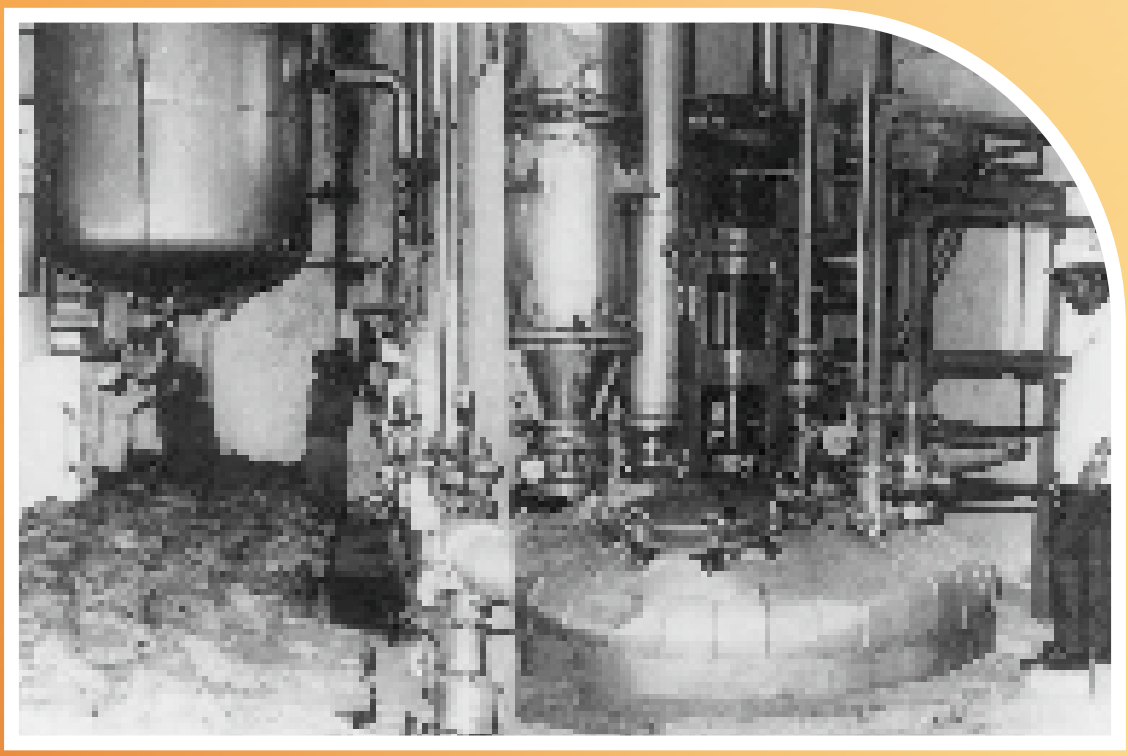
CSIR-NCL

Success Stories

Archives & Science Museum
CSIR-National Chemical Laboratory, Pune

1960s

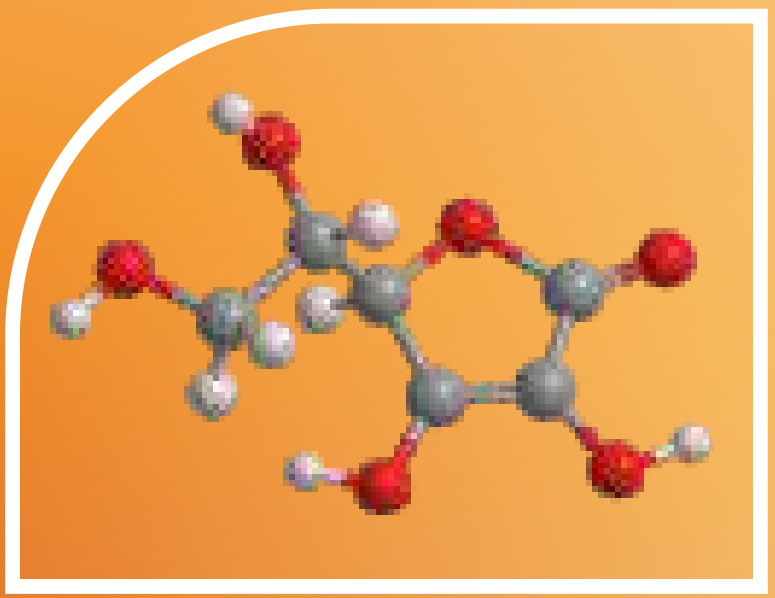
Acetanilide for Paracetamol



Hindustan Organic Chemicals Ltd., Rasayani, Maharashtra

A process was developed for the continuous production of pharmaceutical-grade acetanilide, the precursor to paracetamol. This technology was transferred to Hindustan Organic Chemicals for commercialization, making it the first technology transferred from all existing national laboratories to an industry.

Vitamin C



Hindustan Antibiotics Ltd., Pimpri, Maharashtra

Indigenous process for the production of Vitamin C developed at CSIR-NCL and licensed to Hindustan Antibiotics.

Hexachloroethane (Frozen Chlorine)

Around 1960, as the India–Pakistan war raged furiously, the Defense Ministry approached CSIR-NCL to quickly develop a process for hexachloroethane production for use in the war as smoke screen.

1970s

Opium Alkaloids

Government Opium & Alkaloid Works, Neemuch, Madhya Pradesh

During a period when a significant portion of Indian opium was exported and re-imported as morphine and codeine, CSIR - NCL worked on the process development of alkaloid extraction. Subsequently, a collaboration with the government-run opium alkaloids factory at Neemuch resulted in the successful indigenous production of morphine, codeine, and other alkaloids.

Chemaprene-Nitrile Rubber

Synthetics and Chemicals Ltd., Bareilly, Uttar Pradesh

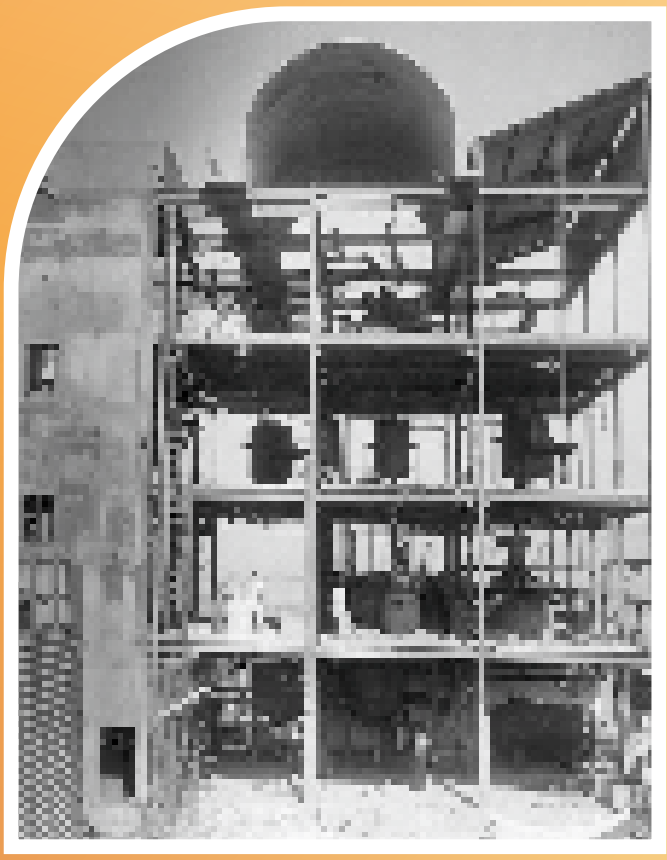
Processes were developed for manufacturing of three different grades of nitrile rubber for applications that require oil resistance. The nitrile rubbers manufactured using the processes standardized in CSIR-NCL was marketed under the trade name Chemaprene.

Dimethylaniline (DMA) Process

Sahyadri Dyestuffs and Chemicals Ltd., Pune, Maharashtra

DMA is used in the production of dyes and the explosive tetryl for detonators. The traditional manufacturing process generated a byproduct equal in volume to the main product, resulting in higher chemical consumption and increased production costs. Using an alumina catalyst, a new vapor-phase process, which significantly minimized the byproduct. This process was successfully implemented at a 2000 tons per annum plant.

Phenthoate



Bharat Pulverizing Mills Ltd., Bombay, Maharashtra

Phenthoate is an organo-phosphorus insecticide recognized for its wide-ranging effectiveness against various agricultural pests, particularly those impacting rice, cotton, tea, and tobacco. The production technology was developed by CSIR-NCL and licensed to Bharat Pulverizing Mills Ltd. in Bombay, which operated a plant with an annual capacity of 300 tons, generating a turnover of Rs 2.2 crores. (1974)

Enzyme Technology

Fermenter at CSIR-NCL

The laboratory discovered new enzymes: NADP-specific glycerol dehydrogenase from Aspergillus niger, succinyl coA-citramalate CoA transferase and citramalyl-CoA lyase of Pseudomonas, etc. Pyruvic oxidase from muscle, hydrogenase from Desulfovibrio and hexokinase and aceyl cholinesterase from brain were obtained for the first time in soluble form. Development of these enzymes made significant contributions to enzymology.

Monoethylaniline

Monoethylaniline Plant, Atul Products, Bulsar, Gujarat

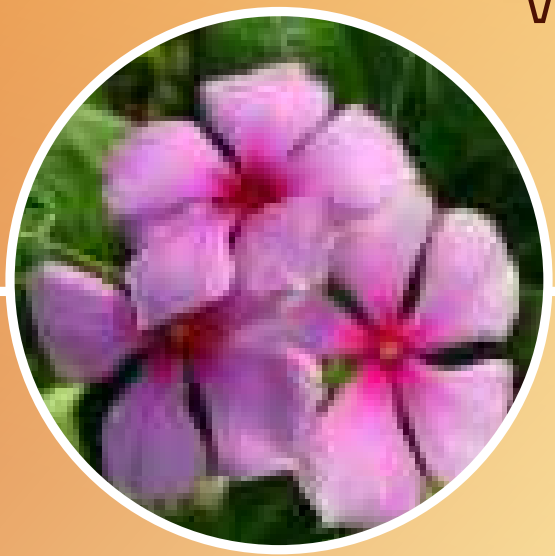
In the 1970s, CSIR-NCL developed a selective liquid phase process for monoethylaniline which was needed by Government of India for defense applications. An integrated pilot plant reactor assembly was then fabricated.

1980s

Development of Anti-Cancer Drugs

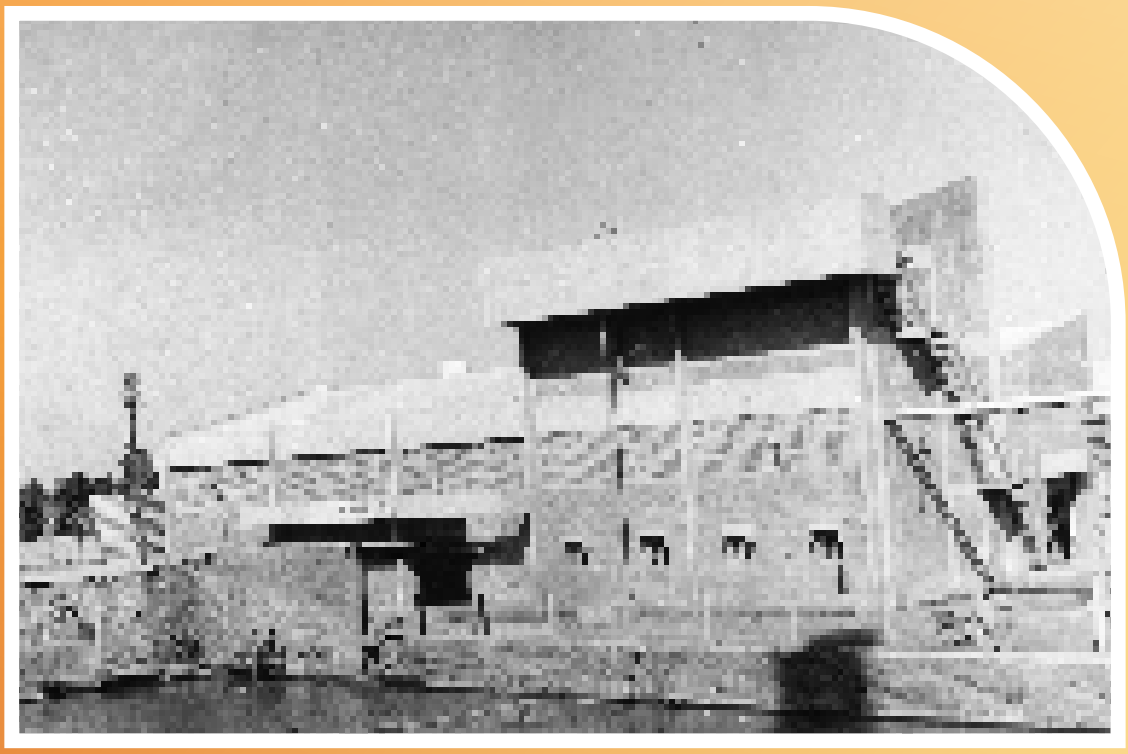
Vinblastine

Vincristine



Drugs synthesized from Vinca Rosea

Sorbitol from Dextrose Monohydrate



Sorbitol Plant at Maize Products Ltd., Ahmedabad, Gujarat

Sorbitol, a sugar alcohol is used in food industries and pharmaceuticals. CSIR-NCL developed a process for the production of sorbitol from dextrose monohydrate and licensed to Maize Products Ltd., Ahmedabad.

Albene Technology

Hindustan Polymers, Visakhapatnam, Andhra Pradesh

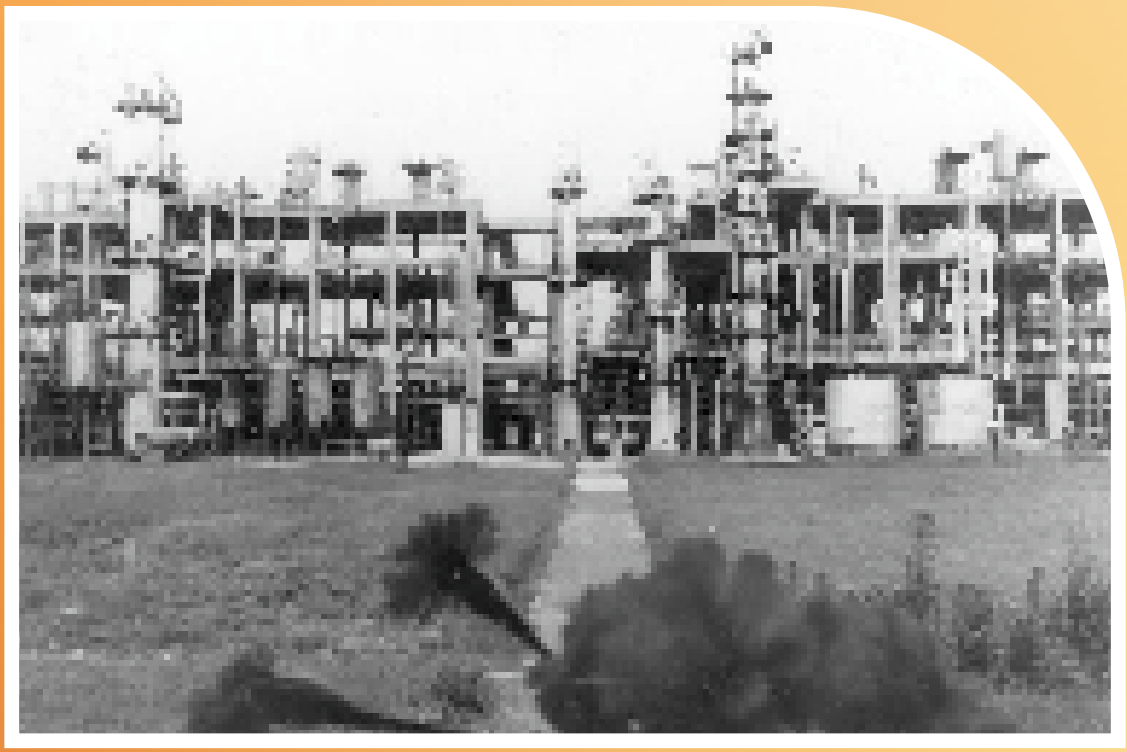
A unique catalytic process for manufacturing of ethylbenzene, used in the production of styrene was developed by CSIR-NCL and licensed it to Hindustan Polymers.

Ethylenediamine (EDA) Process

Diamines and Chemicals Ltd., Kalol, Gujarat

EDA is largely used in the manufacturing of agrochemicals and textile intermediates. CSIR-NCL developed a process for indigenous production of EDA and licensed it to Diamines and Chemicals Ltd.

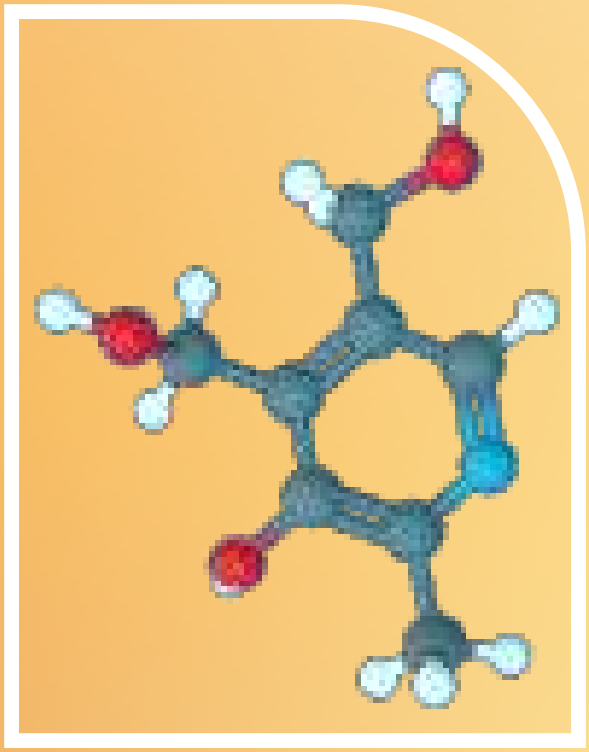
Acrylic Esters



Indian Petrochemicals Corporation Ltd., Vadodara, Gujarat

Acrylic ester monomers are required to produce acrylic fibers. Process for indigenous in-house manufacturing of acrylic esters was transferred to Indian Petrochemicals Corporation Ltd. (IPCL).

Vitamin B6



Lupin Laboratories Ltd., Bombay, Maharashtra

Indigenous process for the production of Vitamin B6 developed at CSIR-NCL and licensed to Lupin Laboratories.

Natural Products

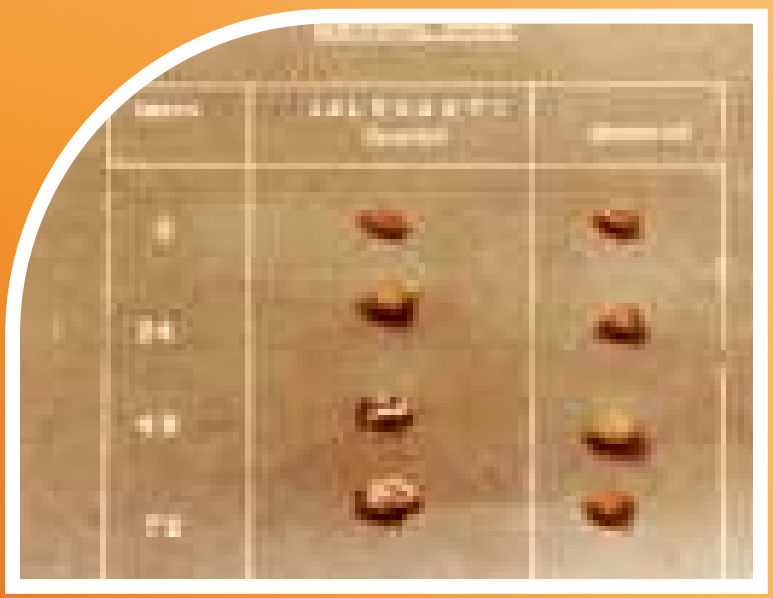
Himalayan cedar wood oil possesses various medicinal properties. CSIR-NCL characterized it uncovering numerous pharmacologically active components. This research led to the development of a commercial preparation- FlematicR, prescribed for various veterinary ailments. The laboratory also investigated and characterized commercially important natural products like turpentines from Pinus, terpenoids from Ailanthus, oils from Lavender, flavonoids from Artocarpus,etc.

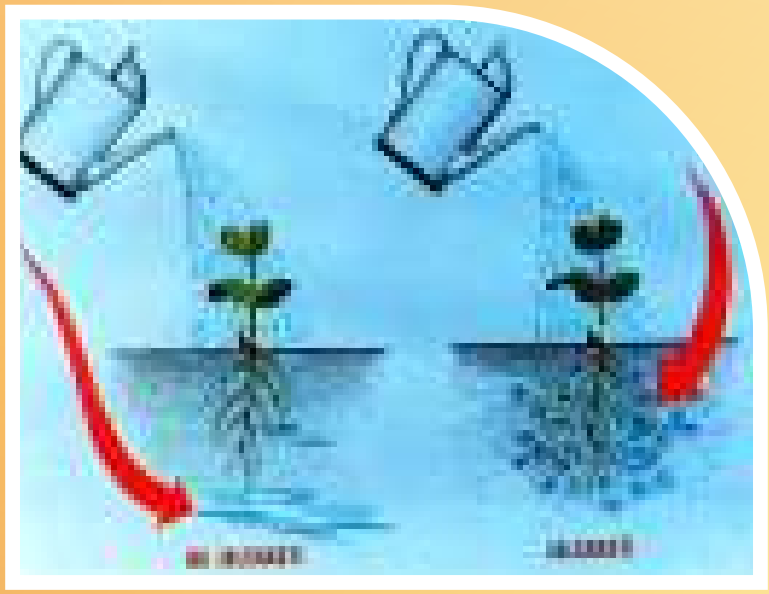
Novel Adhesives for Automotive

Clutch discs with adhesive & rivets

CSIR-NCL developed an innovative adhesive that bonds friction materials to clutch discs without using rivets. This unique formulation provides the necessary lap shear strength while maintaining essential cushioning properties for clutch applications and licensed to Bajaj Auto, Pune.

Jalshakti





CSIR-NCL developed a gel, which could absorb 100 to 500 grams of water per gram of material. Its potential impact in India, particularly given the country's unique agro-climatic conditions, was significant. With about 70% of India's cultivable area relying on rain-fed agriculture, the introduction of such materials could dramatically enhance agricultural production by mitigating soil moisture stress during uncertain rainfall periods.

Narcotics Detection Kit

CSIR-NCL developed a kit to identify suspected narcotic substances, and this technology was commercialized by Hindustan Antibiotics Limited.

1990s

Contributions in Plant Tissue Culture

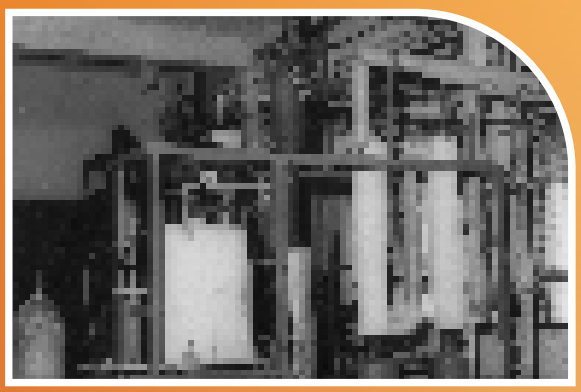
Tissue culture is an efficient technique for plant propagation that involves cultivating plant cells, tissues, or organs in a controlled environment on nutrient-rich culture media. In 1992, a tissue culture pilot plant facility was designed and commissioned, with a production capacity of one million plants per year. This facility focuses on multiplying economically important species, such as bamboo, teak, and eucalyptus.

NCL's Zeolites - The Encilites (High Performance Catalysts)

Encilite Catalyst

Encilite - 1 (Xylofining Technology)

Efficient catalyst for the oxidation of p-xylene to terephthalic acid for the manufacture of polyesters.



Ethyl Benzene Plant of Hindustan Polymers, Vizag

Encilite -2 (For Ethyl Benzene)

A unique process for direct alkylation of benzene with ethanol to produce ethyl benzene, a precursor to styrene for polymer industries.

Methyl Ethyl Ketone Pilot Plant (Enciox) at CSIR-NCL

Encicarb and Enciox

Encicarb used for carbonylation of methanol to acetic acid and Enciox for the oxidation of a mixture of C4 hydrocarbons to methyl-ethyl ketone.

Encilium Technology for Alcohol

Dhampur Sugar Mills Ltd., Bareilly, Uttar Pradesh

CSIR-NCL developed a novel strain of yeast which increased the alcohol fermentation efficiency compared to the conventional processes.

Bamboo Blooming

As bamboo was considered not amenable to breeding, there was not much work done on its floral biology and breeding behavior. Studies at CSIR-NCL unfolded the mechanism of flowering at the molecular level resulting in the development of bamboo varieties that rapidly propagate. This spectacular success brought the CSIR-NCL worldwide acclaim.

Alphonso Mango

In 1994, Indian government launched a national program focused on the micro-propagation of mangoes. Among different varieties, the renowned Alphonso, was entrusted to CSIR-NCL. A dedicated team of researchers investigated this mango's distinctive taste, texture, and aroma and explored flavor variations. The team characterized key compounds like mesifuran, (Z)-ocimene, and octalactone in Devgad Alphonso. These findings were instrumental in securing the Geographical Indication Tag for the Devgad Alphonso Mango.

Homobrassinolide Technology

Brassinolide, a powerful plant growth hormone that accelerates the rate of cell elongation and cell division used for growing high quality grapes. Technology for the production of brassinolide was developed by CSIR-NCL and licensed to Bahar Agrochem and Feeds Pvt. Ltd., Ratnagiri, Maharashtra. Commercialized by the trade names: Combine, Bountee, Double and Bumper.

2000s

High Quality Lactic Acid

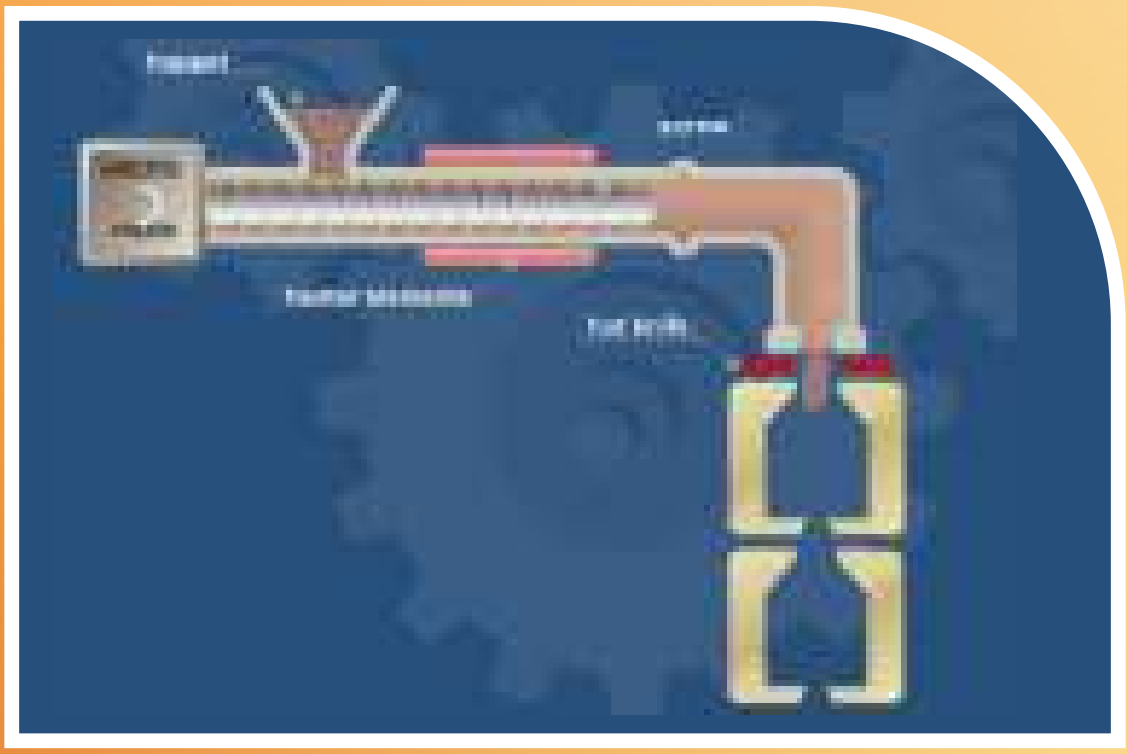
Fermentation Pilot Plant for Lactic Acid
Godavari Sugar Mills, Maharashtra

CSIR-NCL developed a process to synthesize lactic acid via fermentation of sugarcane-derived feedstock. The downstream processing of the fermentation broth resulted in the production of 99.9% pure lactic acid.

Sheep breed NARI-Suwarna

Shepherd's income depend on the number of lambs produced, yet most Indian breeds typically yield only one offspring per lambing. To address this, CSIR-NCL and the Nimbkar Agricultural Research Institute (NARI) developed the prolific breed 'NARI Suwarna' by crossbreeding Deccani sheep from Maharashtra with the Garole sheep from West Bengal. This cross breed can produce more than one offspring in each lambing. This research significantly benefited the Indian sheep breeding industry. CSIR-NCL was awarded 'CSIR Award for S&T Innovations for Rural Development' for the year 2007 (CAIRD-2007).

Tris-hydroxy-phenylethane (THPE) Production Process



THPE is used in manufacturing of specialty polycarbonates. CSIR-NCL developed an indigenous process with GE Plastics, USA and Excel Industries, Roha, which reduced the production cost significantly. Apart from the royalties, the laboratory was conferred with the CSIR Technology Award in 2003.

2-Acrylamido 2-T-Butyl Sulfonic Acid (ATBS) Technology

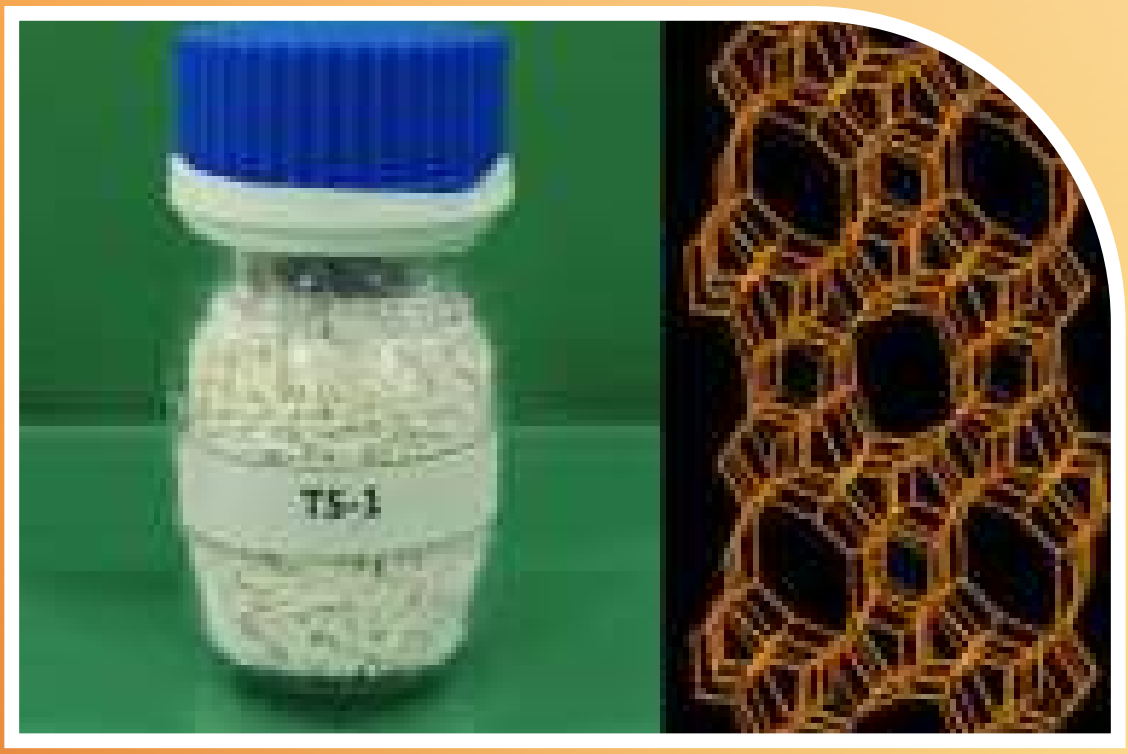
Vinati Organics Ltd. ATBS Plant, Lote, Maharashtra

ATBS, a specialty chemical used in many applications such as: oil recovery, drilling, and also a corrosion and scale inhibitor. The laboratory synthesized ATBS in a novel continuous one step process with no effluents. CSIR-NCL received the CSIR Technology Award for ATBS in 2005.

Porous Polyethylene

Facial prosthetics are specialized implants designed to restore or enhance facial appearance, often following surgery, injury, or congenital conditions. These prosthetics can be made from materials like silicone or polyethylene. CSIR-NCL developed several innovative biocompatible and prosthetic implants from porous polyethylene.

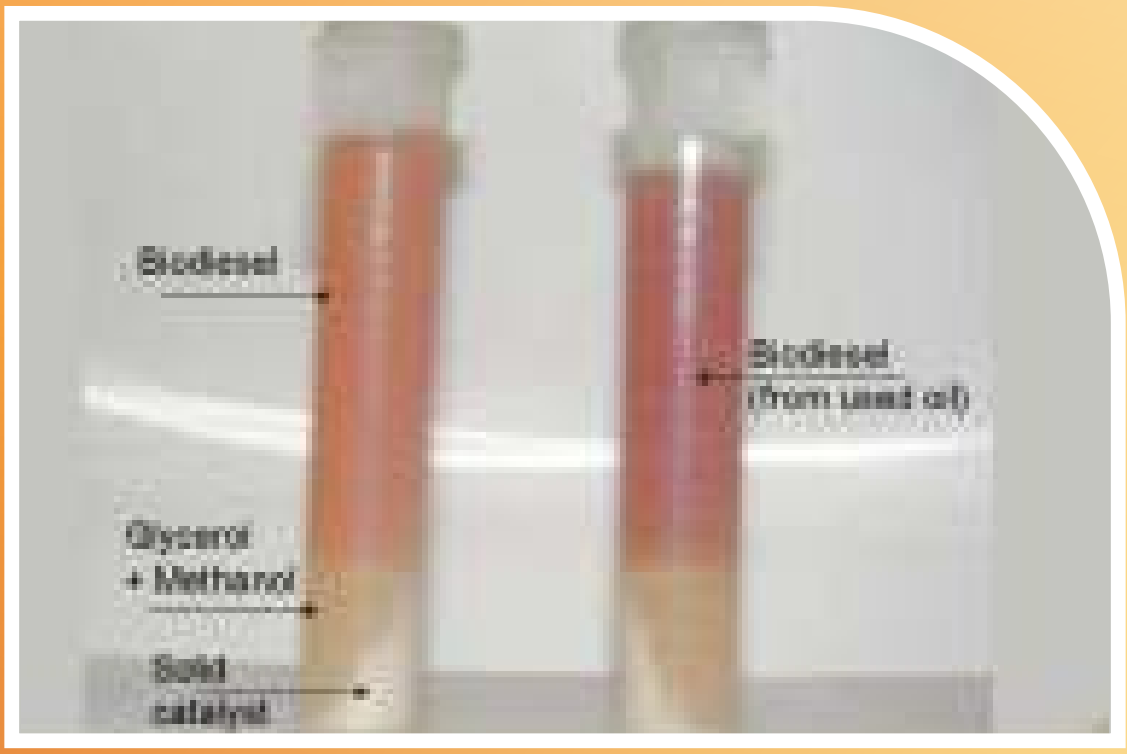
TS-1 Catalyst



Titanosilicate-1 (TS-1) Catalyst
Licensed to Sud-chemie India Pvt. Ltd., Vadodara, Gujarat

This high-value catalyst developed at CSIR-NCL found application in processes like (1) the production of catechol and hydroquinone from phenol (pharmaceutical application), (2) the epoxidation of propylene to produce propylene oxide (food additive), (3) the epoxidation of allyl chloride to form epichlorohydrin (synthetic material), and (4) the synthesis of heterocycles such as pyridine and substituted pyridines (solvents).

Efficient Process for Biodiesel



CSIR-NCL developed a novel catalyst that achieved 95-98% conversion of oils like Jatropha and unrefined rubber seed oil into biodiesel, a renewable alternative to petrol and diesel.