

Overview

Chemical Engineering and Design Division of IIIM, Jammu is engaged in process development and scale-up of laboratory processes on pilot plant. Generally extraction processes are carried out on various herbal/medicinal plants. These extraction processes are scaled-up from 100/500 g laboratory-scale to 15-20 kg pilot plant scale processes. Thereafter their various process parameters are optimized, in order to maximize the yield of these extractions.

Mission and Goals

- ❖ To Scale-up and optimize laboratory scale processes, in order to develop cGMP compliant and commercially viable technologies transferable to user industry.
- ❖ Develop standardized & quality traditional medicines which are affordable to community.
- ❖ Develop new rational formulation of traditional drugs.
- ❖ Generate sufficient data for effective regularization and control of herbal / traditional medicines moving into international markets.
- ❖ Generate authentic and accurate, clinically acceptable data, which can potentially lead to new IPR's.
- ❖ Objectives:
 - To obtain "New process data"
 - Improve Yields and Conversions
- ❖ Evaluation of Products & By-products
 - Preliminary cost estimation
- ❖ In order to Maximize yield, Optimisation of following process parameters is carried out: Plant Mat./ Solvent Ratio; Temperature of Extraction Number of Extractions; Time of each extraction.

Competencies

- ❖ Process Development and scale up of chemical processes from laboratory to pilot scale. For this purpose, a multipurpose batch extraction pilot plant, developed, designed and fabricated in IIIM Jammu is presently being used. A new computer controlled cGMP extraction plant has been installed and commissioned in chemical engineering (IIIM Jammu) for this purpose.

- ❖ Plant Capacity: To process around 15-20 kg of material per batch.
- ❖ Up scaling carried out from 100 g to 15/20 kg scale
- ❖ Purpose to reduce STEPS, reduce SOLVENTS and increase SAFETY of lab.
- ❖ Processes during their scale up on pilot scale.

People

Name	Expertise	E-mail
V.K.Koul	Head of CE&D	vkoul@iiim.res.in
Suman Koul	-	
Ram	Plant operator	
Rakha		
Sat Pal	Plant operator	
Tilak Raj	Skilled worker	

Area of Research

- ❖ Scaled up and optimized process on pilot plant for the extraction of *Tinospora cordifolia*. The technology was transferred to M/S Nicholas Piramal, Mumbai.
- ❖ Scaled up and optimized process on pilot plant for the extraction of Calcitriol from *Cestrum diurnum*. The technology was transferred to M/S Genova Biotech Ltd. Hyderabad.
- ❖ Scaled up and optimized process on pilot plant for the extraction of Acteoside from *Colebrookia opp*. The technology was transferred to M/S Ochoa Pharma, New Delhi.
- ❖ Scaled up and optimized process on pilot plant for the extraction of Hyperforin and Hypericin from *Hypericum perforatum*. The technology was transferred to M/S Nicholas Piramal, Mumbai.
- ❖ Executed the turnkey project of cGMP compliant Herbal drugs extraction pilot plant for M/S Tropical Botantics, Malaysia

Facilities

One old solvent extraction plant along with solvent recovery system, concentration unit and drying unit
Second complete cGMP Herbal Drugs Extraction unit was designed, fabricated, installed and commissioned in March 2009 at IIIM, Jammu. The major equipments of the plant are as follows:-

- ❖ Plant material air dryer.
- ❖ Plant material Grinder and screening system.
- ❖ R.O. plant for process water.

- ❖ Extraction system with condensers breathers and automatic material handling system.
- ❖ Batch solvent storage tanks
- ❖ Solvent recovery unit with condenser, breather and storage tanks.
- ❖ Wiped film evaporator with accessories.
- ❖ Vacuum pan drier.
- ❖ Vacuum tray drier
- ❖ Spray drier
- ❖ Dry Extract sealing unit.

The plant has been installed on proper steel structure and following utilities were also installed with appropriate header lines for inlet and outlet of water, chilled water, air, vacuum and steam etc.

- ❖ Boiler – Cap- 600kg/h (Thermax make)
- ❖ Cooling tower
- ❖ Chilling plant
- ❖ Air compressor
- ❖ Vacuum pumps

The entire plant is controlled by PLC/computer with bypass lines for manual operation.

Current Research

- ❖ Process development for extraction of Stevioside/Rebaudioside rich extract from *Stevia* (*Industry Linkage- Sahara India*)
- ❖ Extraction step optimized on pilot scale.
- ❖ Color absorption/adsorption and final concentration and drying in development stage.
- ❖ Aim to obtain white crystalline powder extract
- ❖ SIMAP Project for Steam distillation & Fractionation of Mint oil at KanyaKumari

Current Projects

- ❖ National facility project “ cGMP pilot plant for Extraction, Formulation and Packaging of Traditional (ISM) herbal Medicinal formulation” financed by IIIM Jammu, DST New Delhi, and Ayush.