**One week AICTE - STTP on**

**Reactive Separations: Fundamentals Through Modeling and Simulation**

**(23rd December - 27th December 2019)**

## Sponsored by

**All India Council for Technical Education (AICTE), New Delhi**

## Organized by

**Departments of Chemical Engineering of**

**Dr. Babasaheb Ambedkar Technological University, Lonere, Dist. Raigad, M. S. 402 103, (https://dbatu.ac.in )**

**and**

**Padmabhooshan Vasantraodada Patil Institute of Technology, Budhgaon- Sangli**

**Venue**

**Department of Chemical Engineering**
**P. V. P. Institute of Technology**
**Budhgaon Sangli**

## Coordinator

**Dr. Yogesh S. Mahajan**

## Co-coordinator

**Prof. Unmesh S. Patil**

## Patron

**Professor V. R. Sastry**
**Hon'ble Vice-Chancellor**

# Introduction

Chemical Engineering implies synthesis of engineering and chemistry. Chemical Engineering has witnessed transforming changes since its development. One of these is combining reaction and separation in a single vessel, namely Reactive Separation (RS), which is a relatively new development combining reaction and separation in one vessel. Industry follows the sequential approach of reaction followed by separation. RS may offer many advantages to processes, wherever it is applicable. It may bring in simplicity and novelty to the process flow sheet. RS is known for investment and operating cost savings garnered on successful scale-up to commercial applications.

Main advantages are in the energy and capital cost savings as well as in increased reaction efficiency. Sometimes, RS is the only method to effect separation where conventional means like distillation and extraction are not feasible. Truly speaking, RS is not new, its application dates back to the early days of gas handling, coal tar and petroleum refining and chemical production. Absorptive reaction processes were commercialized long back. But R&D activities related to the area of RS were not explored.

In late 1970s and early 1980s, commercial applications of Reactive Distillation (**RD**) or Catalytic Distillation (**CD**) for methyl acetate and methyl tertiary butyl ether (MTBE) production were introduced. Many applications using catalytic distillation are currently commercialized. Reactive Separation processes include Extraction (**RE**),

Adsorption (or Chromatography **RC**), Crystallization (**RCr**), Membrane Separation or Membrane Reactor (**MR**) and miscellaneous applications. All these combinations involve coupling of reaction and one of the separations in one single vessel, due to which complexity of the combined process may shoot up multifold. Despite of the various advantages offered, several constraints may also be imposed with unforeseen difficulties.

The aim of this short term training program (STTP) is to cover the fundamentals of the various Reactive Separation processes in detail. It is also necessary to understand the fundamentals, the physical / chemical model be clearly understood. Modeling and simulation thus, plays a very important role in the understanding and application of RS to industrial problems. For each process, case studies will be explained so that the subject matter is clear through real life examples. The sessions will be delivered by eminent personalities in the field who have vast experience. Professors and experts from following organizations will deliver the sessions:

I. IIT Bombay,
II. ICT, Mumbai,
III. NCL Pune,
IV. NIT Warangal,
V. Consultant from Pune and
VI. DBATU, Lonere

There will be hands on sessions on MATLAB and simulation software which will help participants in understanding the concepts and applying them to real industrial problems. The purpose of this FDP is two - fold: first, the participants will be made aware of the fructifying changes in RS that have occurred over the years and secondly they will be motivated to consider one of these fields by active participation through research and development.

## Eligibility and Selection Criteria

The program is open to teachers of AICTE / UGC approved Institutions and working in the fields of Chemical / Petrochemical / Petroleum / Polymer and allied branches and Engineering chemistry as well as Ph. D. students (Research Scholars). A few industry participants can also be accommodated. The program will accommodate at least 40 participants on '**first come first served**' basis and hence it is necessary to submit duly completed applications by registered post as well as by email as early as possible. The selected participants will be informed by email well in advance. So, it is required to submit correct email ID.

## The University and the Departments

**About the University:**

Dr. Babasaheb Ambedkar Technological University is located at Lonere, the place in the ranges of Western Ghat, at the base of Raigad fort, the place from where Chhatrapati Shivaji Maharaj administered his major activities. The University was established in the year 1989 by the Government of Maharashtra and it is making its mark in the field of research and technological services through its dedicated faculty and disciplined students. Presently, the University conducts eight B. Tech. and six M. Tech. programs

in various disciplines of engineering and technology and also Ph.D. in various disciplines of engineering and technology. The University has become the affiliating Technological University of Maharashtra from 2016 by the Maharashtra Act No. XXIX of 2014.

The Chemical engineering department of the university is well known for its well qualified staff and research activities. The department offers B. Tech., M. Tech. and Ph.D. in Chemical Engineering and has excellent reputation.

**About PVPIT:**

The institute was established in the year 1983 by great visionary Padmabhooshan Dr. Vasantraodada Patil, initially with five under graduate programs with the sole objective of rural development through technical education. The institute is approved by AICTE New Delhi, and is affiliated to DBATU Lonere. Currently the institute is offering eight programs in U.G. as well as P.G. The institute is reputed for its high academic standards, well maintained discipline and excellent infrastructural facilities. The institute is located at Budhgaon, on Sangli -Tasgaon road and is about 7 km from Sangli.

**About Chem. Eng. Dept. at PVPIT**

The department of Chemical Engineering at PVPIT was established in the year 1983, initially with intake capacity of 30, later increased to 60 in the year 1998. The department has well qualified, experienced & devoted faculty. The department is well equipped with all the laboratory facilities and has strong alumni base across India and abroad. The department has consistent placement record and is continuously improving to offer excellent learning environment to students.

## Accommodation

Free multi-seated accommodation will be provided in college Guest House / College hostels as per availability.

## Registration fee

There is no registration fee for the course.

## Important Dates:

- **Last date of receipt of application forms duly filled in: 10th December 2019. However, since seats are 40, early submission would ensure the seat.**
- **Information of selection: before 15th December 2019.**

## Instructions:

- Participants from Recognized Institutes (Maharashtra as well as other States) will be given actual travel expenditure (generally second class train fare by the nearest route) as per AICTE / University norms.
- It is recommended to bring scientific calculators. It is also desirable, if possible, to bring Laptops with Microsoft Excel® (with solver option enabled) and Matlab® installed for better benefits, although it is not compulsory.
- Duly filled and signed forms may be scanned and sent via email as an advance copy.
- The course is fully **sponsored by AICTE**. Lodging, Boarding and Course material will be provided to all participants.
- **Kindly note that the course will be conducted at the PVPIT campus.**

# Application form

**One week AICTE – STTP on**

**'Reactive Separations: Fundamentals Through Modeling and Simulation'**

**(23rd December - 27th December 2019)**

**(Sponsored by: AICTE, New Delhi)**

i. Name in full: _____
_____

ii. Date of Birth: _____

iii. Designation: _____

iv. Institution: _____
_____

v. Whether the Institution is AICTE / UGC recognized: _____

vi. Highest Educational Qualification:

a. Experience (Teaching / Research / Industry, in Years): _____

vii. Subjects Taught over last three years:

viii. Address for correspondence with email ID, alternate email ID, Mobile and Phone No.: _____

_____

_____

## Declaration:

The information provided above is true to the best of my knowledge. If selected, I agree to abide by the rules and regulations of the course and shall attend the course for the entire duration. I also undertake to inform the Coordinators in case I am unable to attend the course, if selected.

Place: Date:

**Signature of applicant with name**

# Sponsorship Certificate

This is to certify that Dr. / Mr. / Mrs. / Ms. _____ is an employee of this Institute and is hereby sponsored to participate in the **One week AICTE – STTP on 'Reactive Separations: Fundamentals Through Modeling and Simulation' to be held between 23rd December - 27th December 2019**

Place: _____

Date: _____

**Signature of Head of Institution (With seal)**

---

Please send completed application forms to either of the coordinators so as to reach early:

1. **Dr. Yogesh S. Mahajan,**
   **Dept. of Chemical Engineering,**
   **Dr. B. A. Tech. University, Lonere,**
   **Tal. Mangaon, Dist. Raigad,**
   **Maharashtra 402103**
   (Mob: 9421939941, 9923188748, Email: ysmahajan@dbatu.ac.in, yogesh_mahajan66@yahoo.com)

2. **Prof. Unmesh S. Patil**
   **Dept. of Chemical Engineering,**
   **PVPIT, Budhgaon, Sangli**
   **Dist Sangli, Maharashtra, 416304**
   Mob: 9850994794
   Email: pvpitchemical@gmail.com

(The form and the certificate can also be neatly typed and used, if needed. Please send a scanned copy of the signed form to the coordinators for fast registration at the email addresses mentioned above. The coordinators may also be contacted for clarifications, if any)

---

One Week STTP

on

# "Reactive Separations: Fundamental through modeling and simulation"

**(**23rd Dec 2019 to 27th Dec 2019)

Sponsored by

**All India Council for Technical Education (AICTE), New Delhi**

Organized by

**Chemical Engineering Department,**
**Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad-MH, 402 103**

Coordinator

**Dr. Y.S.Mahajan,**
**Professor, Department of Chemical Engineering,**
**Dr. Babasaheb Ambedkar Technological University, Lonere, Raigand-MH**

Venue

**Chemical Engineering Department,**
**PadmabhooshanVasantraodada Patil Institute of Technology Budhgaon Sangli-MH**

# Contents

# Reactive Distillation: Facts and Practice

**Dr. Yogesh S. Mahajan**

**Department of Chemical Engineering**

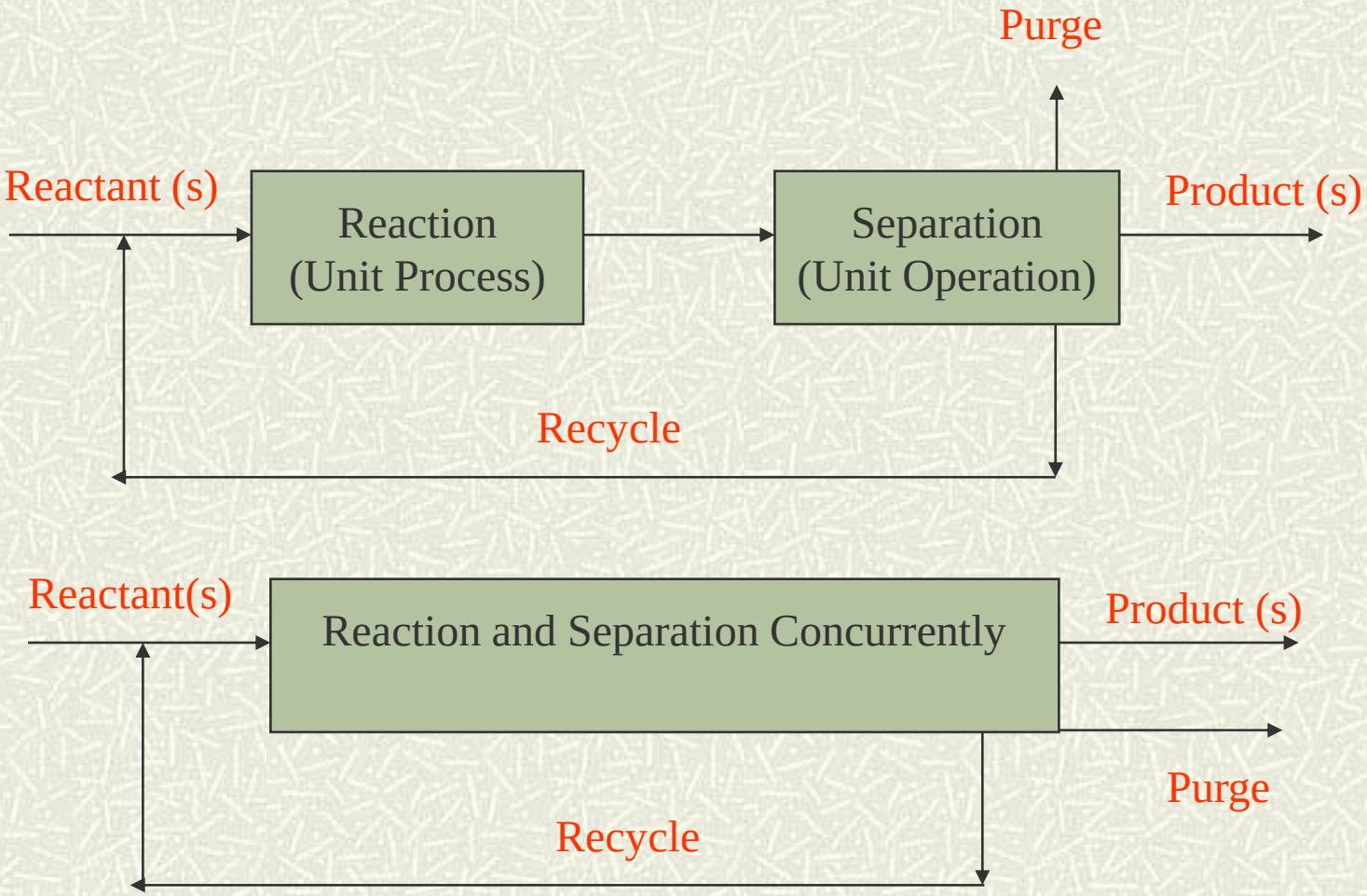
**Dr. B. A. T. University, Lonere**

**M. S. 402 103**

# Reactive Distillation: Facts and Practice

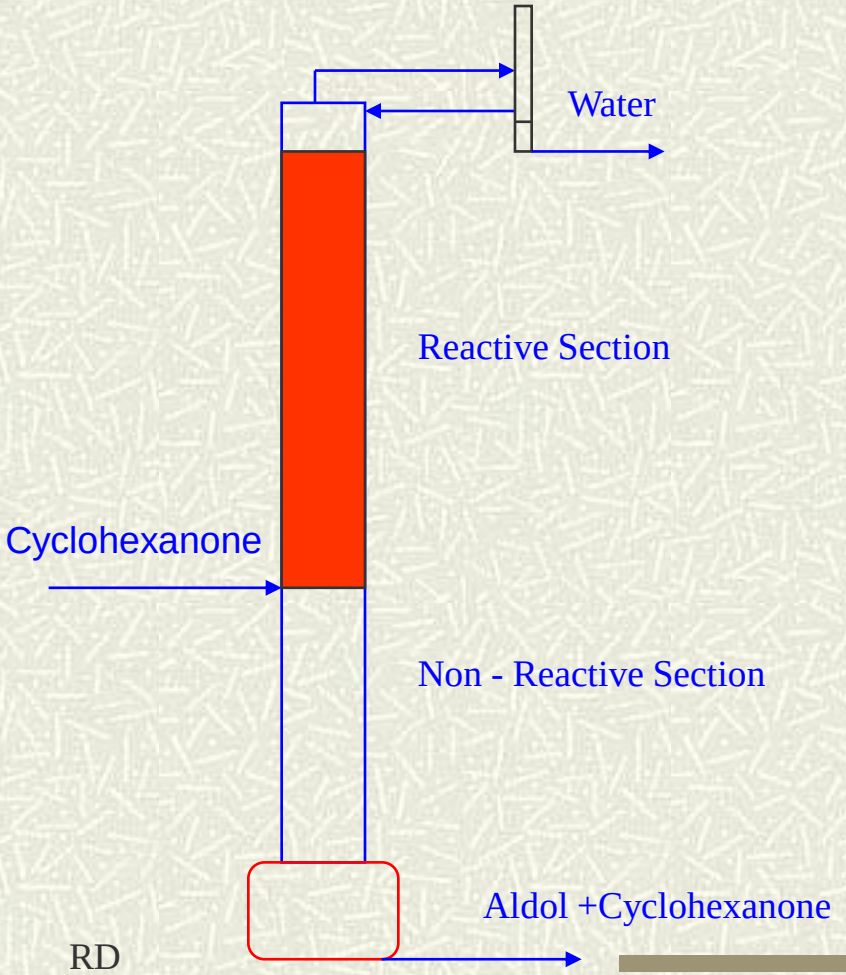
**For every problem under the sun,**
**There is a way or there is none!**
**If there is one, try to find it!!**
**If there is none, never mind it!!!**

# Reactive Separations



# Reactive Distillation: Case Study I

## Cyclohexanone: 156, Product: 268, Water: 100, Azeotrope 95

# BRD and CRD Runs

| BRD (100 gm cat.) | % Conversion | % Selectivity |
|---|---|---|
| 500 watt | 93.45 | 94.13 |
| 750 watt | 94.2 | 88.23 |
| 1000 watt | 97.8 | 85.36 |

| CRD: Flow rate (ml/hr) | Catalyst loading (gm) | % Conversion | % Selectivity |
|---|---|---|---|
| 245 | 50 | 76.5 | 81 |
| 540 | 100 | 74.82 | 85 |
| 540 | 50 | 74.11 | 88 |

**Batch kinetics: Conversion 28 - 45%; Selectivity 75 - 86%; BRD lab scale: Conversion 94%; Selectivity 70%**

# Conclusions

**RD can be effective provided:**

1. **Reaction and Distillation Conditions allow so**
2. **Care is taken to utilize system properties**
3. **Economy is favorable**

***Remember again!***

**For every ailment under the sun, there is a remedy or there is none!**
**If there is one, try to find it, else never mind it!!**

# Review of Membrane Technology for the renovation of Waste to Wealth

By

Dr. P. G. Jadhav

Associate Professor & Head

Department of Chemical Engineering

Shri Guru Gobind Singhji institute of Engineering & Technology

Vishnupuri Nanded

# Outline of this Presentation

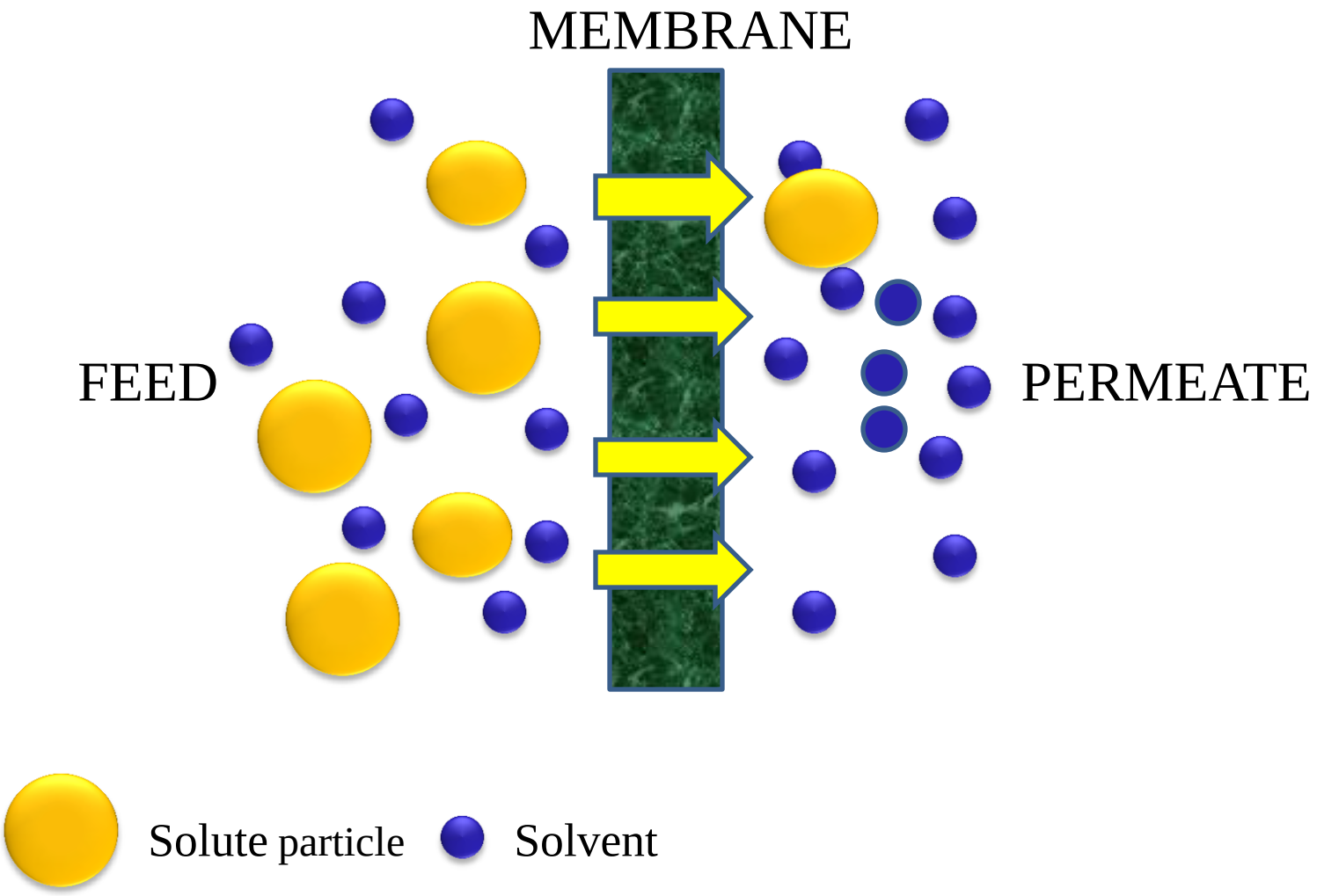


- Brief Overview of Membrane Technology
- Industrial Effluent Treatment for Solvent Recovery
- Membrane Bioreactor & Application
- Conversion of Contaminated Water Resources to Drinkable Water
- Membranes for Waste to Energy Generation
- Application of Membrane Technology for Food & Health

# Membrane Definition & Mass Transfer in Porous Media



**A Membrane is a thin barrier which allows selective & controlled transfer of a species from one bulk phase to another**

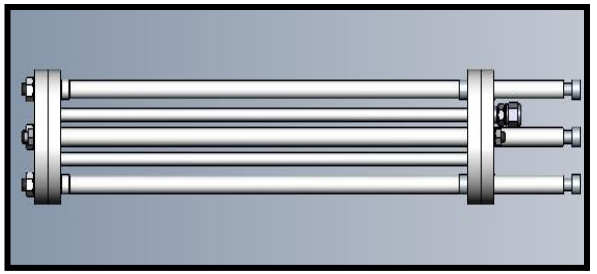


# Membrane Separation Techniques

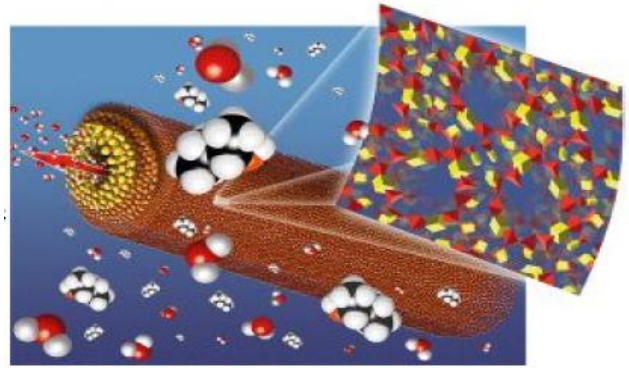


- Pressure-driven membrane process
  - Microfiltration
  - Ultrafiltration
  - Nanofiltration
  - Reverse osmosis
- Concentration-driven membrane process
  - Membrane distillation
  - Pervaporation
  - Gas separation
  - Forward Osmosis
- Temperature-driven membrane process
  - Membrane distillation
  - Thermo-osmosis
- Electrical potential-driven membrane process
  - Electro-dialysis
  - Electrophoresis
  - Fuel cells

Polymeric Flat Sheet Membrane



Ceramic Membrane



Polymeric Spiral Wound Membrane

Polymeric Hollow fiber Membrane

## WHY MBR?

**1. REUSE QUALITY EFFLUENT**

Effluent BOD < 5 mg/L

Effluent TSS < 5 mg/L

Total Phosphorus < 0.5 mg/L

Total Nitrogen < 10 mg/L

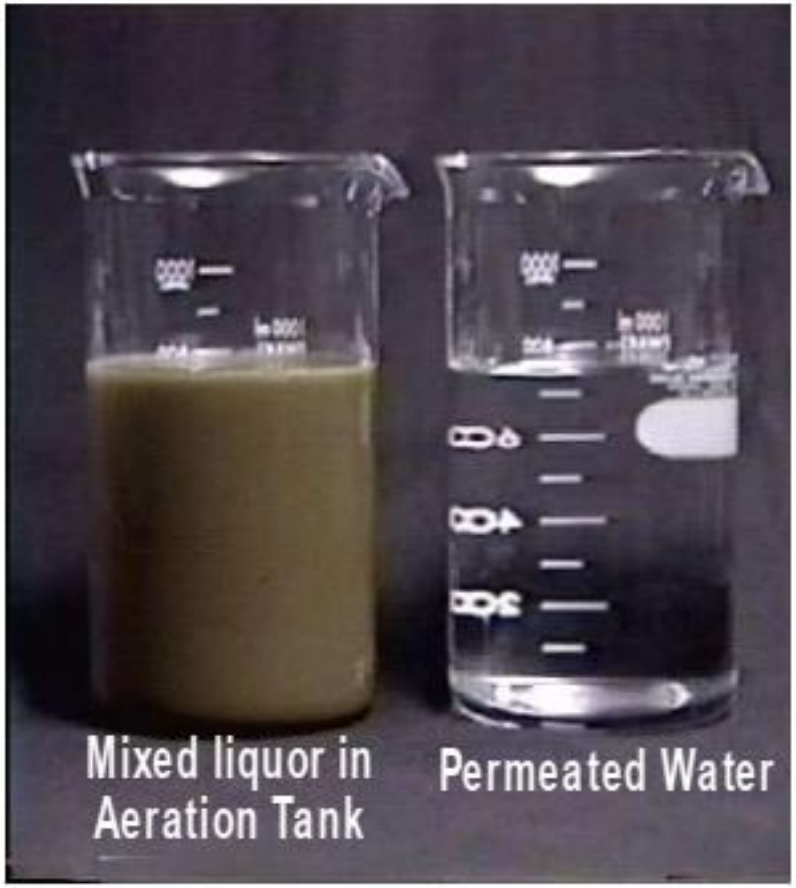
Ammonia < 1 mg/L

Turbidity < 0.2 NTU

Up to 6 log removal of bacteria*

Up to 4 log removal of viruses*

SILT DENSITY INDEX < 3
(SUITABLE FOR RO FEED)



# Conclusions: Approach to Water Purif. & Reject Management

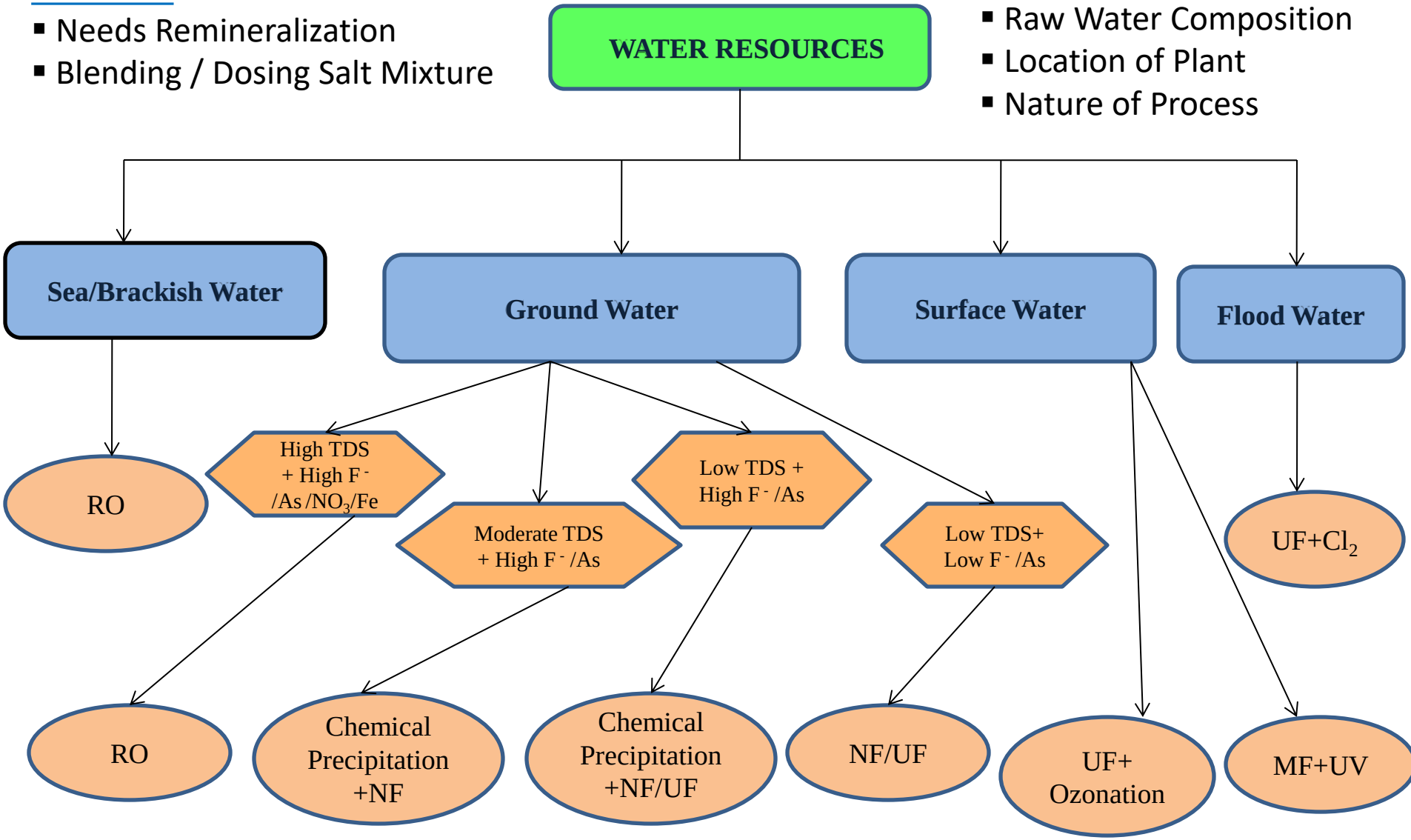


**RO Water**

- Needs Remineralization
- Blending / Dosing Salt Mixture

**Reject Treatment**

- Raw Water Composition
- Location of Plant
- Nature of Process



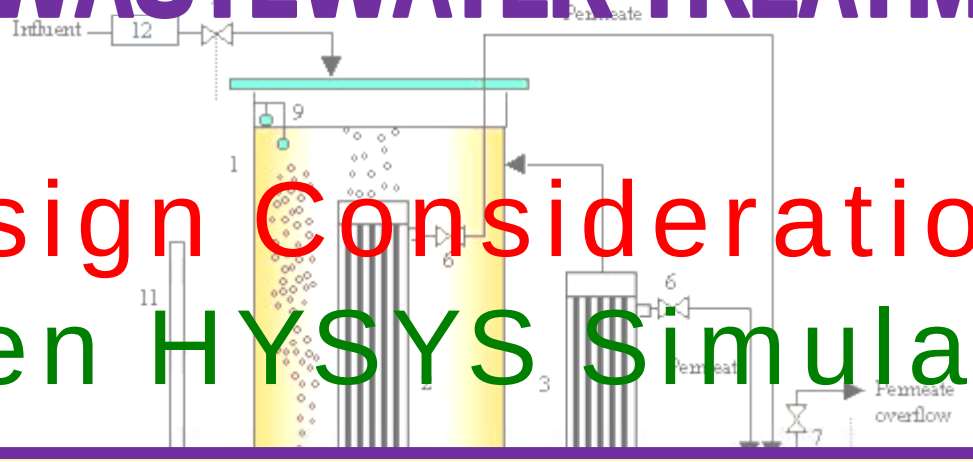
# CONCLUSION



Membrane Technology represents a highly versatile range of technologies that potentially provide solutions to technological problems in wide variety of Industries as well as Society

# REACTIVE SEPARATIONS

# MEMBRANE BIOREACTOR FOR WASTEWATER TREATMENT




## Design Considerations

## Aspen HYSYS Simulation

**Dr Ratnadip R Joshi**

**Asso Dean: Quality Assurance**

**Associate Professor**

**Department of Chemical, Petroleum and Petrochemical Engineering**

**MAEER's Maharashtra Institute of Technology**

**Dr Vishwanath Karad MIT World Peace University**

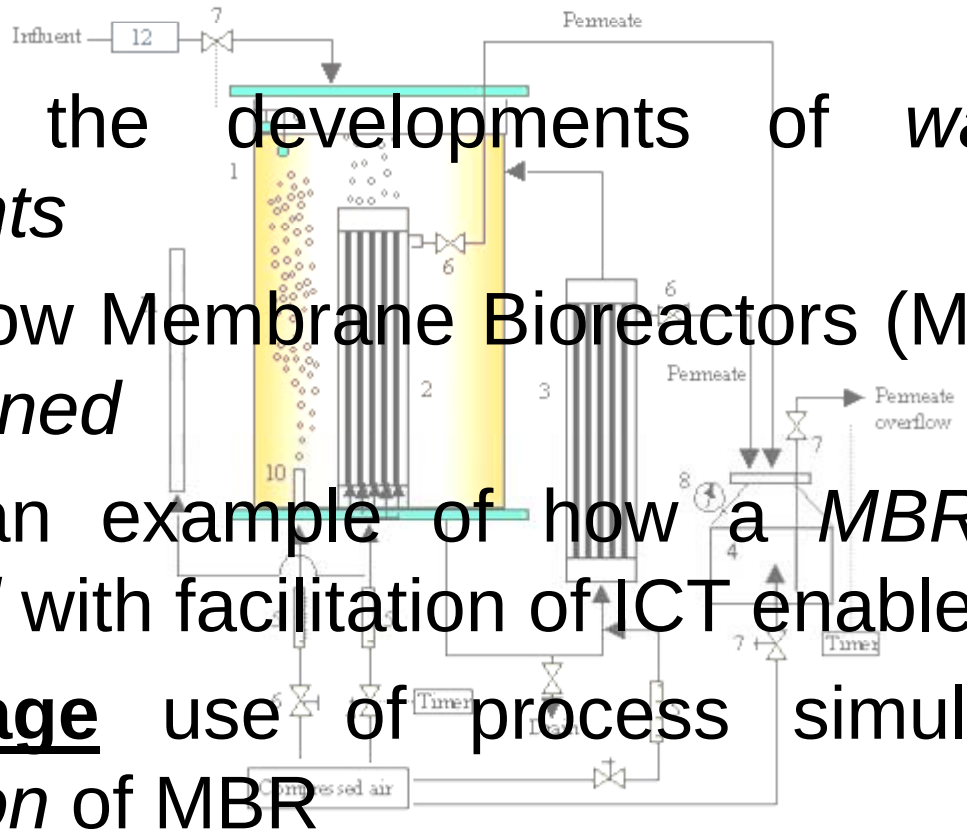
124, Paud Road, Kothrud, Pune-411038, INDIA.

ratnadip.joshi@mitpune.edu.in

09423332754

# Outcomes of this session:

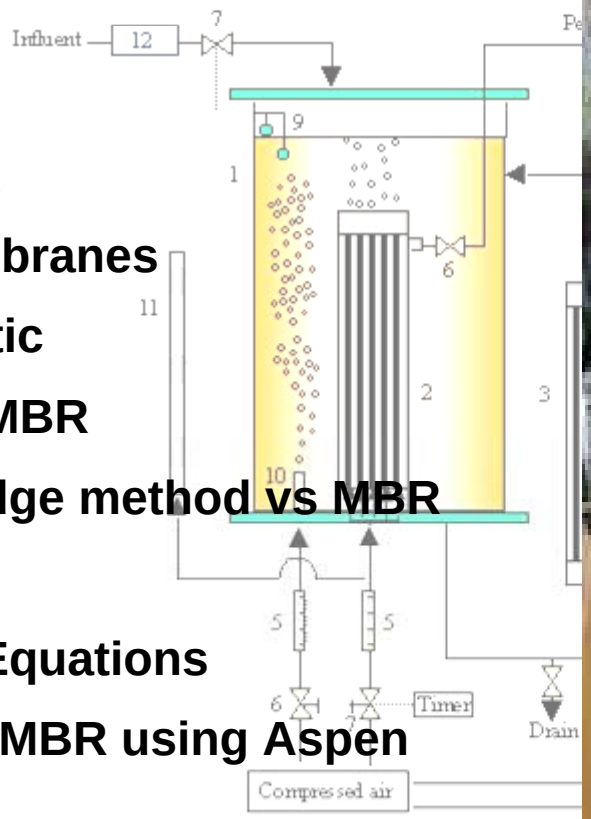
At the end of this session, the participants shall be able to:

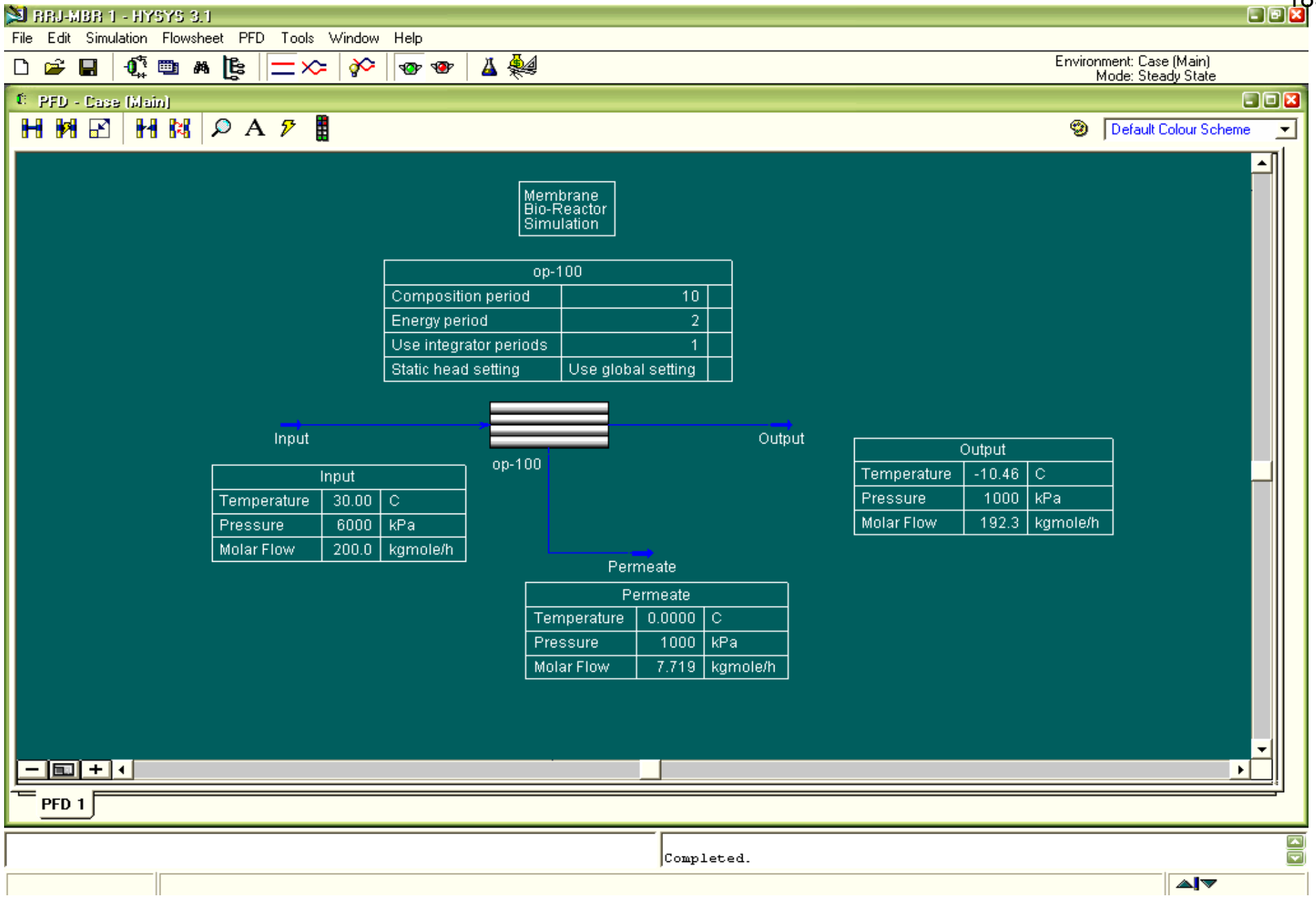



- **<u>Review</u>** the developments of *wastewater treatments*
- **<u>Show</u>** how Membrane Bioreactors (MBRs) can be *designed*
- **<u>Share</u>** an example of how a *MBR can be modeled* with facilitation of ICT enabled tools
- **<u>Encourage</u>** use of process simulators for *simulation* of MBR

# CONTENTS

- Wastewater treatment methods
- Disadvantages of current methods
- Need of MBR
- What is MBR
- Types of MBR
- Types of Membranes
- MBR Schematic
- Operation of MBR
- Activated sludge method vs MBR
- Case Studies
- MBR Design Equations
- Simulation of MBR using Aspen HYSYS





RRJ-MBR 1 - HYSYS 3.1
File Edit Simulation Flowsheet PFD Tools Window Help
Environment: Case (Main)
Mode: Steady State
PFD - Case (Main)
Default Colour Scheme
Membrane Bio-Reactor Simulation
op-100
Composition period 10
Energy period 2
Use integrator periods 1
Static head setting Use global setting
Input
op-100
Output
Permeate
Input
Temperature 30.00 C
Pressure 6000 kPa
Molar Flow 200.0 kgmole/h
Output
Temperature -10.46 C
Pressure 1000 kPa
Molar Flow 192.3 kgmole/h
Permeate
Temperature 0.0000 C
Pressure 1000 kPa
Molar Flow 7.719 kgmole/h
PFD 1
Completed.

The image part with relationship ID rId2 was not found in the file.

# अमंत्रमक्षरं नास्ति
# नास्ति मूलमनौषधम् ।
# अयोग्य: पुरुषो नास्ति
# योजकस्तत्र दुर्लभ: ॥

ॐ सह नाववतु ।
सह नौ भुनक्तु ।
सह वीर्यं करवावहै ।
तेजस्वि नावधीतमस्तु मा विद्विषावहै ।
ॐ शान्तिः शान्तिः शान्तिः ॥

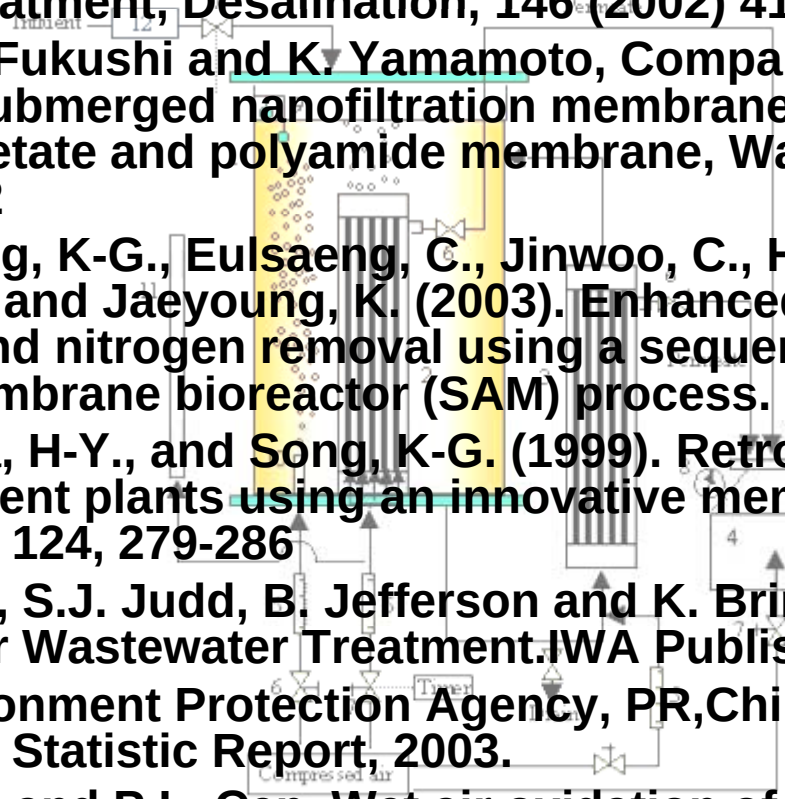
Om Saha Nau-Avatu |
Saha Nau Bhunaktu |
Saha Viiryam Karavaavahai |
Tejasvi Nau-Adhiitam-Astu Maa Vidvissaavahai |
Om Shaantih Shaantih Shaantih ||

Meaning:

1: Om, May God Protect us Both (the Teacher and the Student).
2: May God Nourish us Both.
3: May we Work Together with Energy and Vigour.
4: May our Study be Enlightening and not give rise to Hostility.
5: Om, Peace, Peace, Peace.

## Research Papers:


- R. Rautenbach and R. Mellis, Wastewater treatment by a combination of bioreactor and nanofiltration,Desalination, 95 (1994) 171–188.
- J.-H. Choi, S. Doccko, K. Fukushi and K.Yamamoto, A novel application of a submerged nanofiltration membrane bioreactor for wastewater treatment, Desalination, 146 (2002) 413–420.
- J.-H. Choi, K. Fukushi and K. Yamamoto, Comparison of treatment efficiency of submerged nanofiltration membrane bioreactors using cellulose triacetate and polyamide membrane, Water Sci. Technol., 51 (2005) 305–312
- Ahn, K-H., Song, K-G., Eulsaeng, C., Jinwoo, C., Hojoon, Y., Seockheon, L. and Jaeyoung, K. (2003). Enhanced biological phosphorus and nitrogen removal using a sequencing anoxic /anaerobic membrane bioreactor (SAM) process. *Desal.* 157, 345-352
- Ahn, K-H., Cha, H-Y., and Song, K-G. (1999). Retrofitting municipal sewage treatment plants using an innovative membrane-bioreactor system. *Desal.* 124, 279-286
- T. Stephenson, S.J. Judd, B. Jefferson and K. Brindle,Membrane Bioreactors for Wastewater Treatment.IWA Publishing, London, 2000.
- National Environment Protection Agency, PR,China, State Environmental Statistic Report, 2003.
- G. Liu, L.C. Lei and P.L. Cen, Wet air oxidation of printing and dying wastewater. J. Zhejiang University, 35(1) (2001) 37–40.

# Chemical Engineering Thermodynamics - An Overview

Sunil S. Bhagwat
Chemical Engineering Department
Institute of Chemical Technology

Nov 2019

# Why things happen





- Nature has many things happening.
- Certain things do not happen ever (on their own)
- Heat flow, water flow...
- Things can sometimes be forced to happen (with efforts)
- A natural driving force
- Rate $\propto$ (driving force)/resistance
- An age old search - Why things happen the way they do? Who gains from it?

- The use of Chemical Engineering Thermodynamics is primarily concerned with the design and performance of a chemical or process plant.
- Many of these processes do not go to completion.
  - e.g. reaction of $N_2 + H_2$ to give ammonia or
  - absorption of $CO_2$ in monoethanolamine or
  - extraction of acetic acid from water by toluene or
  - precipitation of a solute from a solution.
- The degree to which these can complete is of crucial importance.
- This comes through the concept of equilibrium - between phases and between reactants.

# Multiple reactions

2 mol methane with 3 mol steam result in an equilibrium mixture of $CO$, $CO_2$, $H_2$, $CH_4$ *and* $H_2O$ at 1000K, 1bar

| | $\delta H^o_{f,298.16K}$ | $\delta G^o_{f,298.16K}$ |
|---|---|---|
| | KJ/mol | KJ/mol |
| $CO$ | -110.6 | -137.4 |
| $CO_2$ | -393.8 | -394.6 |
| $H_2O$ | -242.0 | -228.8 |
| $SO_2$ | -296.83 | -300.19 |
| $SO_3$ | -395.72 | -371.06 |
| $NH_3$ | -46.11 | -16.45 |
| $CH_4$ | -74.52 | -50.46 |

# Multiple reactions

2 mol methane with 3 mol steam result in an equilibrium mixture of $CO$, $CO_2$, $H_2$, $CH_4$ *and* $H_2O$ at 1000K, 1bar

| | $\delta H^o_{f,298.16K}$ | $\delta G^o_{f,298.16K}$ |
|---|---|---|
| | KJ/mol | KJ/mol |
| $CO$ | -110.6 | -137.4 |
| $CO_2$ | -393.8 | -394.6 |
| $H_2O$ | -242.0 | -228.8 |
| $SO_2$ | -296.83 | -300.19 |
| $SO_3$ | -395.72 | -371.06 |
| $NH_3$ | -46.11 | -16.45 |
| $CH_4$ | -74.52 | -50.46 |

ICT, Mumbai

THANK YOU

ss.bhagwat@ictmumbai.edu.in

# kinetic study on drinking water denitrification using a membrane bioreactor

By

Dr. V.S.Sapkal

Dept. of Chemical Technology

Sant Gadgebaba Amaravati University, Amaravati

During the biological process of denitrification, nitrate is first microbiologically reduced to nitrate and nitrite, then nitric oxide (NO) and nitrous oxide (N2O), and finally to molecular nitrogen(N2)

The biological removal of nitrate can be affected by various factors: different types of external C sources , various types of micro-organisms, various operational parameters such as C/N ratios, temperature , pH , dissolved oxygen, hydraulic retention time , nitrate and nitrite concentratios and mixed liquor suspended solids .

In addition, nitrate removal highly depends on the substrate amount that influences the denitrification rate, denitrification yield,

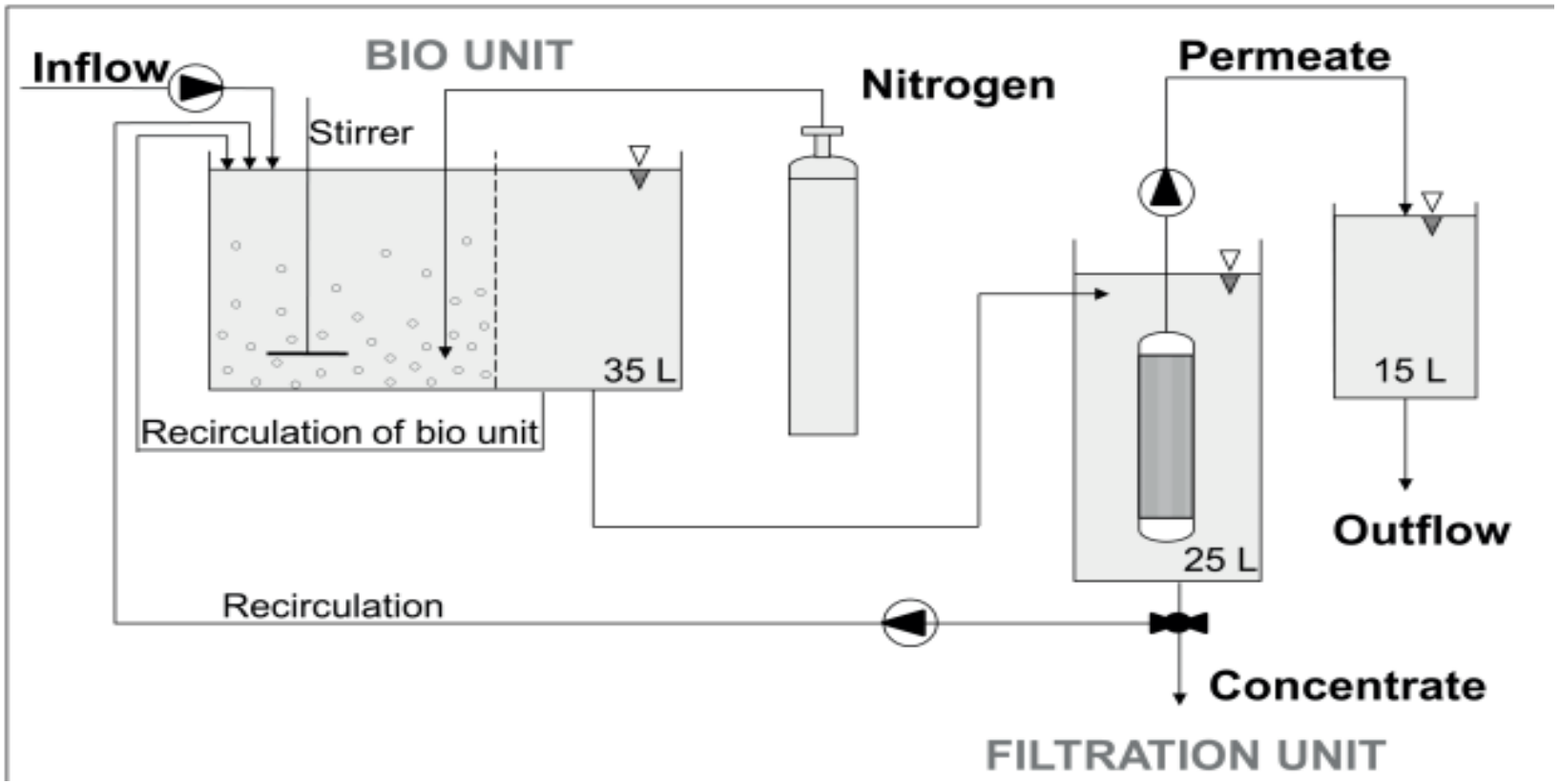
The influent NO3-N concentration was 80 mg L-1 (carbon to nitrogen ratio C/N = 1.88/1), and the average denitrification efficiency achieved 84 to 89%.

During the research when the C/N ratio increased from 1.5 up to 2.5, the removal efficiency increased up to 95%.

To develop a kinetic model to describe the microbial growth of drinking water denitrification using MBR

A kinetic analysis was conducted by assuming Monod kinetics to be appropriate for substrate consumption, and a constant biomass concentration

Determination of the Monod kinetic parameters was based on the experimental values for the mass concentration of substrate at the outflow ($\gamma S$), and the calculated dilution rates ($D$).



The calculated value of the yield coefficient was *YX/S* = 0.35 mg biomass mg-1 COD (*R2* = 0.94), which meant that approximately 35% of biomass was produced regarding the consumed substrate

Drinking water denitrification using a membrane bioreactor was studied and the validity verified regarding the Monod kinetics of microbial growth.

The maximum specific growth-rate was determined to be 0.31 h-1, half-saturation constant 5.4 mg L-1 and a yield coefficient of 35%

Dr. V. P. S. S. M's Padmabhooshan Vasantraodada Patil
Institute of Technology Budhgaon (Sangli) 416304.
Department of Chemical Engineering,
(UG Programme NBA Accredited)
One Week AICTE Sponsored Short Term Training Program (STTP)
On
"Reactive Separations: Fundamentals through Modelling and Simulation"
(23rd December to 27th December, 2019)

# List of Participants

| Sr. No. | Name | email ID | Designation | Name of Institute (Academic) | Mobile no | Remark |
|---|---|---|---|---|---|---|
| 1. | Mr Rahul Vishnupant Hinge | hingerv@pravaraengg.org.in | Asst Professor | P.R.E.C, Loni | 9922402840 | |
| 2. | Dr SandeepAvinash Thakur | satsan17@rediffmail.com | Asst Professor | SSBTS, COET, Jalagaon | 9421891390 | |
| 3. | Miss Asmita Pravin Patil | asmitapatil10@gmail.com | Asst Professor | PVPIT, Budhgaon | 9028711267 | Internal Participant |
| 4. | Mr Sachin Bhikchand Divate | sachindivate2007@rediffmail.com | Asst Professor | P.R.E.C, Loni | 7588169546 | |
| 5. | Miss Ujwala Ramchandra Shinde | ushinde32@gmail.com | Asst Professor | PVPIT, Budhgaon | 8530225453 | Internal Participant |
| 6. | Mrs Pallavi Chandrakant Kale | kalepallavi2911@gmail.com | Asst Professor | PVPIT, Budhgaon | 8668242886 | Internal Participant |
| 7. | Prof Shrikrishna Babar Bobde | bobadesb@gmail.com | Asst Professor | F.A.M.T, Ratnagiri | 8888952450 | |
| 8. | Prof Sudhakar Ramnath Kadam | sudhakar@yahoo.com | Asst Professor | P.R.E.C, Loni | 7588513541 | |
| 9. | Dr Nitin Gajanan Kanse | nitin_475@yahoo.co.in | Asst Professor | F.A.M.T, Ratnagiri | 9960835696 | |

**Dr. V. P. S. S. M's Padmabhooshan Vasantraodada Patil**
**Institute of Technology Budhgaon (Sangli) 416304.**
**Department of Chemical Engineering,**
**(UG Programme NBA Accredited)**
**One Week AICTE Sponsored Short Term Training Program (STTP)**
**On**

# "Reactive Separations: Fundamentals through Modelling and Simulation"

**(23rd December to 27th December, 2019)**

| Sr. No. | Name | Email ID | Designation | Name of Institute (Academic) | Mobile no | Remark |
|---|---|---|---|---|---|---|
| 10. | Mr Dattatray Chimaji Dengale | dattatray.dengale@famt.ac.in | Asst Professor | F.A.M.T, Ratnagiri | 8208354885 | |
| 11. | Mr Abhijeet Dilip Patil | adpchemical@gmail.com | Asst Professor | PVPIT, Budhgaon | 9511786987 | Internal Participant |
| 12. | Dr Sanjay Laxman Bhagat | callbsanjay@yahoo.com | Asso. Professor | PVPIT, Budhagaon | 9921133349 | Internal Participant |
| 13. | Mr Bhushan Shamrao Satvekar | bhushans7676@gmail.com | Asst Professor | PVPIT, Budhgaon | 9022608464 | Internal Participant |
| 14. | Dr.Vivek Digambar Talnikar | vdtalnikar@gmail.com | Asso. Professor | GIT, Lavel | 9422727389 | |
| 15. | Mr Sudhir S Gandhi | ssgandhi@chem.maepune.ac.in | Asst Professor | MIT AOE, Pune | 9764143441 | |
| 16. | Mr Sanjeev Yashwant Pawar | sanjeevpawar.chem@yahoo.co | Asso. Professor | PVPIT, Budhagaon | 8411009045 | Internal Participant |
| 17. | Mr Vikas Balasaheb Pawar | vikas93@rediffmail.com | SG Lecturer | PVPIT, Budhgaon (Diploma ) | 9890156076 | |
| 18. | Mr Suresh Dhanyakumar Chougule | bandu_chougule@yahoo.co.in | Lecturer | PVPIT, Budhgaon(Diploma ) | 9921814902 | |
| 19. | Mr Milind Madhav Joshi | milind_18@rediffmail.com | Lecturer | PVPIT, Budhgaon (Diploma ) | 9325550469 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20. | Mr Sumit Sanjay Potdar | sumitpotdar3@gmail.com | Lecturer | PVPIT, Budhagaon (Diploma ) | 7385400766 | |
| **Sr. No.** | **Name** | **Email ID** | **Designation** | **Name of Institute (Academic)** | **Mobile no** | Remark |
| 21. | /Mrs Arati Arvind Patil | sumansurve@gmail.com | Lecturer | PVPIT, Budhagaon (Diploma ) | 8928006969 | |
| 22. | Mr Sameer Vijay Padia | sameerpadia1001@gmail.com | Lecturer | PVPIT, Budhagaon (Diploma) | 9922472362 | |
| 23. | Mr Vivek Sadashiv Kore | vivekskore@pvpitsangli.edu.in | Asst Professor | PVPIT, Budhgaon | 9921565669 | Internal Participant |
| 24. | Mr Unmesh S Patil | unmeshp9@gmail.com | AssoProfessor | PVPIT, Budhagaon | 9850554754 | Internal Participant |
| 25. | Mr Prashant Bhimrao Dhanke | dbpchem@gmail.com | Asst Professor | PVPIT, Budhgaon | 9226012686 | Internal Participant |
| 26. | Mr Ravindra Laxman Nibe | nibere@pravaraengg.org.in | Asst Professor | P.R.E.C, Loni | 9975776171 | |
| 27. | Mr Kalyan Ishwar Patil | kip@tkietwarana.ac.in | Asso Professor | TKIET, Warananagar | 9822041691 | |
| 28. | Mrs Shilpa Sarjerao Patil | shilpaspatil@tkietwarana.ac.in | Asso Professor | TKIET, Warananagar | 9850963115 | |
| 29. | Miss Farahanaz M Bagwan | bagwanfarahanaz@gmail.com | Asst Professor | DYPCET, Kolhapur | 8208590322 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 30. | Dr Vishal Jarardan Suryavanshi | vishal.suryavanshi16@gmail.com | Asst Professor | PVPIT, Budhgaon | 9975758502 | Internal Participant |
| 31. | Mr Ekant Das | ekantdas@gmail.com | Research Scholar | DBATU Lonere | 9975776171 | |
| **Sr. No.** | **Name** | **Email ID** | **Designation** | **Name of Institute (Academic)** | **Mobile no** | **Remark** |
| 32. | Dr Swapnil Dharaskar | swapnildharaskar11@gmail.com | Asso Professor | PDPU, Gandhinagar | 7600924111 | |
| 33. | Mrs Vijaya B. Satghare | satghare.vijaya@gmail.com | Asst Professor | UICT, KBCNMU, Jalgaon | 8830123897 | |
| 34. | Dr Utkarsh Maheshwari | drutkarshm@gmail.com | Asso Professor | DYPIEMR, Akurdi | 9772976299 | |
| 35. | Mr Dhundiraj P Deshpande | dhundiraj12@gmail.com | Asst Professor | DYPIEMR, Akurdi | 7588189574 | |
| 36. | Mr Pankaj N Vardhe | vardhepankaj@gmail.com | Asst Professor | DYPIEMR, Akurdi | 8011491881 | |
| 37. | Mr Ramsingh V Thakur | rvt114@gmail.com | AsstProfessor | DYPIEMR, Akurdi | 7077109878 | |
| 38. | Dr Shailesh Adinath Ghodke | saghodke@gmail.com | AssoProfessor | DYPIEMR, Akurdi | 8275889853 | |
| 39. | Dr Kishor Tukaram Jadhav | ktjadhav1@gmail.com | Professor | DYPCET, Kolhapur | 9158195999 | |
| 40. | Mr Manishkumar A Patil | manishkumarpatil@gmail.com | Asst Professor | DYPCET, Kolhapur | 8055719406 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 41. | Mr Kiran M Patil | kmpatildyp@gmail.com | Asst Professor | DYPCET, Kolhapur | 9028397585 | |
| 42. | Dr Rahul Appasaheb Patil | rahulapatil1978@gmail.com | Asst Professor | DYPCET, Kolhapur | 9823167767 | |
| **Sr. No.** | **Name** | **Email ID** | **Designation** | **Name of Institute (Academic)** | **Mobile no** | **Remark** |
| 43. | Mr Arvind Vilas Patil | arvindpatil2899@gmail.com | Asst Professor | DYPCET, Kolhapur | 9637303999 | |
| 44. | Mr Rahul Datttary Mahajan | rahuldmahajan22@gmail.com | Asst Professor | DYPCET, Kolhapur | 8669116943 | |
| 45. | Mr Pushpadant Mahavir Magdum | pmmagdum.instru@pvpitsangli.edu.in | Asst Professor | PVPIT, Budhgaon | 7620948400 | Internal Participant |
| 46. | Mr Sandeep S Haral | sandeepsharal@gmail.com | Lecturer | Govt Polytechnic, Jalna | 9823312442 | |
| 47. | Mr Sagar Mahadev Jangam | sagarjangam.9026@gmail.com | Asst Professor | DBATU Loenre | 9096090954 | |
| 48. | Mr Raju Kappusing Marag | raju.marag@famt.ac.in | Asst Professor | F.A.M.T, Ratnagiri | 9890701143 | |
| 49. | Mr Manoj Namdev Chavan | gmanojchavan@gmail.com | SG Lecturer | PVPIT, Budhgaon (Diploma ) | 9860028162 | |
| 50. | Mr Vikas L Karade | vlkarade.instru@pvpitsangli.edu.in | Asst Professor | PVPIT, Budhgaon | 9850220760 | Internal Participant |

| | | | | | | |
|---|---|---|---|---|---|---|
| 51. | Mr Sagar S Sutar | sssutar.instru@pvpitsangli.edu.in | Asst Professor | PVPIT, Budhgaon | 88856912533 | Internal Participant |