


### 3.2.1 - Research funds sanctioned and received from various agencies, industry and other organisations

3.2.1.



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#### PROJECT COMPLETION REPORT

- Reference No: Letter of sanction from TEQIP-III; No. 01/TEQIP-III/CRIP/2019-20/ YSM, dated 23/08/2019
- Project Title: Development of Vapor Liquid Equilibrium for Industrially Important Chemical Reaction
- Duration of Project: August 2019 to March 2021 (extended due to COVID)
- Principal Investigator: Dr. Yogesh S. Mahajan, Dr. B. A. Technological University, Lonere
- Co-Principal Investigator: Dr. Sanjay Kamble, NCI., Pune
- Fund allocated: Rs. 3, 00, 000/- vide sanction letter no. 1/TEQIP-III/CRIP /2019-20/ YSM, (23.08.2019)


#### Part A - Summary Report

##### 1. Project Objectives


Objective as per the approved Project	Fully Achieved/Partially Achieved (indicate shortfall)	Reason for Partial Achievement
i. Simulation of the VLE ii. Experimental Determination of the VLE iii. Parameter Regression iv. Simulation of the separation sequence	i. Task Completed ii. Work started and is expected to be complete in @ 3 months from now, in a normal course of work. iii. Work is almost completed but needs refining iv. Work has started and is expected to be complete in @ 3 months from now, in a normal course of work.	Due to COVID-2019, the research team was not allowed to be present for work, the procurement of new equipment and repair of old equipment was not possible till December 2020. After that due to new sharp increase of numbers of COVID patients, work could not progress.

##### 2. Deliverables

Deliverables as per the approved Project	Fully/Partially/Not Achieved	Reason for Partial/ Non Achievement
i. VLE of all possible binaries ii. Consistency tests iii. Regression of parameters iv. Simulation of the separation sequence	i. Generation of VLE has started ii. Consistency will be tested once VLE is generated iii. Regression work has started iv. Simulation work has started but needs input of VLE data	Due to COVID-2019, the research team was not allowed to be present for work, the procurement of new equipment and repair of old equipment was not possible till December 2020. After that due to new sharp increase of numbers of COVID patients, work could not progress.



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**Head of the Department**  
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 Dr. Babasaheb Ambedkar  
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### 3. Specific Benefits/Outcome

(Please give details)

- Patent, if any: NIL
- Product/Process developed/ technology transferred: VLE Data is being developed and it is expected that based on the expertise developed, processes will be developed which can be transferred to interested industry partners.
- List of Publications arising from the Project  
(Indicate Impact Factors of the Journals; attach Copies of the Papers)  
One Conference and one International Journal publication is expected  
Work has started and is expected to result in publications as indicated.
- Linkages developed: NCL Pune, IIT Bombay

### 4. Project Budget (Final)

Sanction No. (Date)	Grant Received (Rs.)	Details of Expenditure Incurred (Item wise)	Amount Sanctioned (in each head) (Rs.)	Amount of expenditure incurred (Rs.)	Duration with dates
No.: 01/TEQIP- III/CRIP /2019-20/ YSM, (23.08.2019)	3,00,000/-	1. Repair and Demonstration of Othmer Still (VLE Apparatus)	74,340/-	74,340/-	August 2019 to March 2021 (extended due to COVID)
		2. Purchase of Ebulliometer (VLE Apparatus)	1,15,345/-	98,412/-	
		3. Purchase of Chemicals	1,10,302/-	1,10,302/-	
		4. Honorarium for 3-day course	*15,000/-	15,000/-	
		5. Honorarium for 3-day course	*2,000/-	2,000/-	
		6. Accountancy Charges	*2,000/-	2,000/-	
Total			3,18,987/-	3,02,054/-	
(* - with a special permission from Registrar as per ref. 4 above)					
Amount Returned: Nil (since the expenditure is more than the sanctioned amount)					

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### Part B – Comprehensive Report

(The Comprehensive Report should be precise and self-contained)

1. Project Title: Development of Vapor Liquid Equilibrium for Industrially Important Chemical Reaction
2. Product/Process as an outcome of the Project, identify Beneficiaries: Vapor Liquid Equilibrium is going to be developed for an industrially important chemical reaction. Industry Institute Laboratory tie ups have been and will be established through this project. Beneficiaries can be among the fine chemical industries like Lupin Pharma, Kolta India etc.
3. Scientific Description of the Product/Process, give Specifications/Standards for the same: VLE for an industrially important chemical reaction (TFA to ETFA, fine chemicals) is going to be developed. The equipment and chemicals are now bought and work has already started. VLE data will be generated which will be as per consistency test standards as per International standards in this regard.

4. Methodology adopted for Development of the Product/Process (State briefly in 300 words)

Vapor Liquid Equilibrium (VLE) for an industrially important chemical reaction (TFA to ETFA, fine chemicals) is going to be developed. Regression of the parameters has been done and with refinement this will be made available to the scientific community. Simulation of both the VLE data as well as the separation sequence is being carried out and will be made available to the scientific community. The experimental setups (one repaired and one procured) are now available and the chemicals needed are also available now and hence it is only a matter of time that we shall be in a position to generate and present this data to the scientific community. The experimental setups have been commissioned and tested. A test VLE was generated and it almost matches with that which is available in the International Standard Literature.

5. Scientific /Technological Formulation giving underlying Basis (Provide sufficient details)

Chemical Engineering Industry manufactures a number of chemicals which need purification for these to be saleable. Distillation is one of the well-known options for separation and purification of chemicals. Distillation is based on the VLE. If the VLE is known correctly, then the design and operation of distillation sequence is accurate. Hence the need of this project. The VLE for all the binaries involved in the given system will be generated and will be used for designing and simulating the distillation sequence.

6. Further Work required, if any, to get full Benefits or enhance Utilization.

Due to pandemic situation, arising due to COVID-2019, the procurement and work

3

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has been extremely delayed in this project. We have now received every thing needed and feel confident that we should be in a position to complete the project in 3-4 months from now. Once the VLEs are generated and the design is available, it will be used to actually perform distillation runs, if funds are made available.

### 7. Recommendations for Utilization of the Product/Process. Give Concrete Steps.

- a. Speedy procurement and other procedures.

Signature of PI

*21/11/2021*  
*23/03/2021*  
**Dr. Yugesh S. Mahajan**

Name of PI **Associate Prof. Chem Engg. Dept**

**Dr. B. A. Tech University**

**Lonere, Dist. Raigad.**

**M.S.-402103**



Signature of Co-PI

Name of Co-PI

*21/11/2021*  
**REGISTRAR**  
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## PROJECT COMPLETION CERTIFICATE

### PROJECT TITLE

Development of Vapor Liquid Equilibrium for Industrially Important Chemical Reaction

### SUBMITTED BY

Dr. Yogesh S. Mahajan

(Name of Principal Investigator)

Chem. Eng. Dept. DBATU, Lonere

(Departmental Affiliation)

(Date of Submission)

Reference No: Sanction Letter No. 01/TEQIP-III/CRIP/2019-20/ YSM, dated 23/08/2019

Project Duration: August 2019 to March 2021 (extended due to COVID)

*24/03/2021*  
Dr. Yogesh S. Mahajan  
Associate Prof. chem Engg. Dept.  
Dr. B. A. Tech University  
Lonere, Dist. Raigad.  
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*23.03.2021*  
Signature of Head of Institute  
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5

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