

PALLAVI SUNIL PARAB

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Birth-Date: 4th August 1987; **Nationality:** Indian; **Marital status:** Single

Ph.D. (Science) Chemistry

Research Topic “Thermodynamics of Phase Equilibria Relevant for Absorption Refrigeration Cycle”

Research Supervisor: Prof. Sunil S Bhagwat

Place of research work: Chemical Engineering Department, Institute of Chemical Technology, Mumbai, India

Brief write-up of work done as a part of **Ph.D. (Science) Chemistry**

The increase in electricity cost and environmental problems has made heat-operated refrigeration cycles attractive especially for industrial applications. The absorption refrigeration cycle is a cooling cycle in which working fluid pair used is an absorbent-refrigerant pair and the energy source for operation is any source of heat including waste heat, solar, agriculture-based residue, etc. The commercially used working fluid pairs for an absorption refrigeration system are water - ammonia and lithium bromide - water. Although, energetically efficient for application at refrigeration temperature above 5 °C, there are several drawbacks of lithium bromide - water working fluid pair; foremost amongst the limitations is the corrosion effect due to lithium bromide salt and crystallization due to low solubility at lower temperature and high concentrations which are required in the operating conditions of absorption refrigeration system. One of the promising salt which can replace lithium bromide in the absorption refrigeration system is potassium formate or potassium formate salt with addition of other salt(s) or anti-crystallization organic solvent. Sustainability of a potential working fluid pair for an absorption refrigeration cycle is validated by studying the physical and thermal properties of mixtures at fixed mass ratio, accurately measured over the wide operating range. In this work, the bubble pressure of potassium formate - water and potassium formate + propylene glycol or glycerol - water based working fluid pair solutions at various temperature and composition with the correlation results were obtained by data fitting of the experimental vapour pressure data with thermodynamic model such as NRTL or E-NRTL model and other physicochemical properties of the working fluid pair are also studied.

M.Sc. (Inorganic Chemistry) – By Papers

Research Supervisor: Dr. Sushama Sathe

Place of research work: Chemistry Department, Ramnarain Ruia College, University of Mumbai, Mumbai, India.

Brief write-up of work done as a part of M.Sc.

Detect level of vitamin-C by colorimetric method and HPLC after giving various treatments (physical and chemical) for preservation of vitamin-C

Research / Work Experience (certificates available as Proof)

1. **2010:** 2 months training in BARC (Uranium Extraction Division) on topic purification of uranium by solvent extraction and determination of uranium and impurities by different analytical techniques, trained to use ICP-AES during the training.
2. **2012-2018:** Worked as Project Assistant on Project Entitled “Cold Storage Facility for Post-Harvest Preservation of Fruits and Vegetables Using Heat Based Refrigeration Technology”. A novel heat-based absorption refrigeration system was installed at Gokul Dairy, Kolhapur, India under this project.

Teaching Experience

1. **2011-2012:** One-year experience as Tutor in Institute of Chemical Technology, Mumbai, India (Conducted Inorganic & Physical Chemistry Practical's and Tutorials of FYBtech, SYBtech and MSc. students).
2. **2019:** Currently working as Visiting Faculty, Conduct Master of Science – Chemistry lectures on topic Solid State Chemistry, Nanomaterials, Chemical Reactivity, Bioinorganic Chemistry and Chemical Bonding in SIES College, Mumbai and Ramnarain Ruia College, Mumbai.

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In-Plant Training & internship (certificates available as Proof)

1. Safety Workshop of Lab Safety in Institute of Chemical Technology, Mumbai, India

Professional Training Received

Year	Nature of Training	Duration	Organization where training was provided
2012-2017	Worked as Project Assistant for Project titled “Cold Storage Facility for Post-Harvest Preservation of Fruits and Vegetables Using Heat Based Refrigeration Technology sponsored by Rajiv Gandhi Science and Technology Commission (RGSTC). Successfully implemented a novel combination of vapour compression refrigeration and heat based vapour absorption refrigeration system at Gokul Dairy, Kolhapur for milk chilling process along with ICT researchers and under guidance of Prof. S. S. Bhagwat. Including experimental work for the implementation of project has also prepared specifications of equipment’s required during project, Project Reports, Interim Project Report, Patent Analysis, SOP of equipment’s, P& ID.	5	Institute of Chemical Technology, Mumbai, India
2012-2018	Determined Physiochemical properties of salt or glycol based working fluids used in Absorption Refrigeration Cycle and determined the correlation data from vapour liquid equilibrium experimental data with thermodynamic models (NRTL, E-NRTL, UNIQUAC, UNIFAC) and empirical equations for various compositions of working fluids. Studied Topics such as Heat & Mass Transfer, Chemical Engineering Thermodynamics, Material & Energy Balance Calculations and Project Management as Credit Courses for completion of Ph.D. research.	6	Institute of Chemical Technology, Mumbai, India

Knowledge of Instrumental Methods of Analysis

Inductively Coupled Plasma (ICP), UV-Vis Spectrophotometry, Atomic Absorption Spectroscopy (AAS), High Pressure Autoclave for Vapour liquid equilibrium determination.

Computer Knowledge

MS Word, Excel, Power Point, Scilab, Matlab, LyX, Lynx, Xmgrace, Xfig, Inkspace

Extra-Curricular Activities (certificates available as Proof)

- Participated in Inter-college Poster competitions during Post Graduation and won second prize on topic solid waste management.
- Volunteered various events such as National Conference of Drug Designing and Inter-college competitions in Ramnarain Ruia College.
- Volunteered Chemcon-2013 held in Institute of Chemical Technology, Mumbai
- Won First Prize in 8th Bry-Air Awards for Excellence in HVAC & R, 2013 through Excellence in Student Category.

Presentations (oral / poster) in Conferences / Workshops / Seminars

1. Oral Presentation “Exergy Optimised Heat Based Refrigeration”, Chemcon,2015, IIT, Guwahati.
2. Workshop “Design of Cold Storage as a part of Cold Chain”, Acrex India, 2016, Bombay Convention and Exhibition Centre, Mumbai

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List of Publications in Peer-Reviewed Journals (published / accepted / under review)

1. Pallavi Parab, Sunil Bhagwat, Thermophysical Properties of Ternary Systems Potassium Formate + Propylene Glycol / Glycerol + Water. J. Chem. Eng. Data, 64, 234-244, 2019.
<https://pubs.acs.org/doi/10.1021/acs.jced.8b00742>
2. Pallavi Parab, Gorakshanath Takalkar and Prof. Sunil Bhagwat “Vapour liquid equilibrium of Potassium formate – Water: Measurements and correlation by e-NRTL model” Indian Chemical Engineer, <https://doi.org/10.1080/00194506.2019.1581096>.
3. Indian Patent: Energy and Exergy Efficient Refrigeration System & Method of Using it. Application No. 201621034194.
4. Kalpana Mahalle, Pallavi Parab, Sunil Bhagwat, Optimization of Cooling Load in the Combined Vapour Absorption-Vapour Compression Refrigeration Cycle Using Exergy Analysis. Indian Chemical Engineer, 1-15, 2018. <https://www.tandfonline.com/doi/full/10.1080/00194506.2017.1418439>

Educational Qualifications (University)

Ph.D. (Science), Chemistry				
Year	Subject	Institute	University	%Marks
2019	Chemistry	Institute of Chemical Technology, Mumbai	Institute of Chemical Technology, Mumbai	Competed Ph.D. (Viva) in 2019
Master of Science (M.Sc.), Inorganic Chemistry				
Year	Subject	Institute	University	%Marks
2010	Inorganic Chemistry	Ramnarain Ruia College, Mumbai	University of Mumbai	56
Bachelor of Science (B.Sc.), Chemistry				
Year	Subject	Institute	University	%Marks
2008	Chemistry	Ramnarain Ruia College, Mumbai	University of Mumbai	65

Educational Qualifications (Pre-University)

Examination	Institution (name, place, state of Institution)	%Marks
S.S.C. (2003)	St. Paul's Convent High School, Maharashtra State Board	68.8
H.S.C. (2005)	Ramnivas Ruia College, Maharashtra State Board	59

References

1. Prof. Sunil S. Bhagwat
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2. Prof. Radha V. Jayaram
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