

RESUME

1. Personal

Name : Dr. S. Mayadevi
Nationality : Indian

2. Academic

Ph. D	Year	: 1992
	Institute	: NCL / Poona University
	Topic	: Adsorption and Mass Transfer in Solid Adsorbents and Catalysts

M.Tech	Year	: 1981
	Institute	: IIT, Madras
	Specialization	: Chemical Reaction Engineering
	Achievements	: Subbaraju memorial prize for securing first rank
	(Grade)	(credit point average 8.22)

B.Sc. Engineering Year : 1979
Institute : Govt. Engineering College, Trichur/Calicut University
Discipline : Chemical Engineering
Achievement : First Class with honours
(% aggregate) : (77.4)

Present Position : Scientist E-II,(Asst. Director grade), NCL, Pune, India
Career : Joined NCL as scient in entry level (Sc. B) in 1983 and has been working on various R & D projects.

3. Skill base

a) Software skills

Exposure to C, C++, VB, SQL, Oracle, Java, XML, ASP, and .Net. Successfully completed C-DACs diploma in Web-enabled Database Technologies in 2003.

b) Technical writing skills

I used to be a regular contributor to our in-house magazine when we had one. Have prepared two technical brochures from scratch for NCL. The first one dealt with our activities in the area of catalysis and chemical reaction engineering (in the year 1999-2000) and the second in 2004 encompassed the research activities of our organization. The work involved collecting the required technical material and organizing it, cover design, supervising photography and layout preparation, interaction with the printer (proof reading and associated activities) etc.

I have been regularly abstracting chemical engineering based research papers for a Bangalore based firm for more than two years.

c) **Communication skills**

Author/co-author of about 20 research papers. I have given several technical/symposia presentation and invited lectures. Organized symposia/workshops/entrance examinations for recruitment in the present organization.

4. Experience

a) **Professional**

More than 20 years of experience in research and development related to catalytic/non catalytic processes, design of pilot plants. Well versed with management of research projects – proposal writing, planning, execution, data analysis, interpretation, report writing and related activities in the management time targeted of projects.

b) **Research**

Research experience encompasses areas of adsorption, mass transfer, separation, catalysis and inorganic membranes/membrane reactors.

1. Catalysis

Kinetics of organic reactions is an area of interest to chemical engineers in the design of reactors. Kinetics of various organic reactions of commercial value using solid (zeolite/metal oxide) catalysts are being looked into in our lab. with a reaction engineering based approach.

Addition of small amounts of promoters / dopants like barium, potassium, cesium etc. significantly affect the performance of silver catalyst in the partial oxidation of ethylene to ethylene oxide. The effect of addition of these materials on the structure, morphology, oxygen chemisorption characteristics and sintering of silver catalysts were studied and related to its activity / selectivity for partial oxidation of ethylene. On the basis of these studies, it was possible to arrive at a recipe for silver catalyst with optimum performance (activity and selectivity) for the partial oxidation of ethylene to ethylene oxide

Coke deposition in molecular shape selective zeolites (eventhough small) can influence the inter crystalline mass transfer of both the reactants and products through the macropores and change the catalytic activity / selectivity. Influence of coking on mass transfer and catalytic properties of commercial Pt-H-ZSM-5 Al_2O_3 catalyst was studied in terms of its acidity distribution, inter crystalline mass transfer, catalytic activity / selectivity in standard test reactions (iso-octane cracking, xylene isomerization, methanol to aromatics conversion) and the nature and location of coke. The results were compared with the effect due to pyridine poisoning . This work gives an insight into the transport of molecules in the intercrystalline space of the catalyst particles and how it is affected by coking / poisoning.

2. Adsorption / Separation

A large number of zeolites were compared for the adsorption of alkanes and alkenes (methane, ethane, ethylene) and carbon dioxide by gas chromatography pulse technique. This technique provides a quick method for the initial screening and selection of adsorbents for the separation of the components of a gas mixture. Two simple apparatus were devised for the collection of adsorption data – one for the adsorption of liquid vapors on solid catalysts / adsorbents (gravimetric method) at low pressures and the second for

the adsorption of gases at moderate pressures (volumetric method). Adsorption isotherm data of methane, ethane, ethylene and carbon dioxide on selected adsorbents were collected and analyzed in detail (fitting to different standard isotherm models and thermodynamic analysis). A number of adsorbents were also screened for their fluoride adsorption capacity in order to develop an adsorption process for the removal of fluorides from water .

3. Inorganic membranes / membrane reactors

We are currently working on a program on the development of inorganic membranes with functional coatings for application in charge-mediated filtration or electrodialysis. This involves preparation, characterization and testing of assymetric membranes with solution / sol precipitated substrate and surface active membrane layer. Another area of interest to us is the development of polymer-inorganic hybrid membranes for application in membrane reactors. We are also working on esterification reactions in membrane reactors for production of esters which are commercially used as plasticisers, intermediates and perfumes / flavors.

5. Publications

1. S.G. Waghlikar, S. Mayadevi, S. Sivasanker, *Liquid phase alkylation of phenol with 1-octene over large pore zeolites*. **Appl. Catal. A: General** 309 (2006) 106
2. S.G. Waghlikar, S. Mayadevi, N.E. Jacob, S. Sivasanker, *Claisen rearrangement of allyl phenyl ether over zeolite beta, mordenite and Y*. **Microporous and Mesoporous Materials**. 95 (2006) 8
3. Nikunj P. Tanna and S. Mayadevi, *Performance analysis of a membrane reactor for reversible reactions*. **Indian Chemical Engineer** 47(3) (2005) 195.
4. N.T. Mathew, S. Khaire, S. Mayadevi, R. Jha, S. Sivasanker, *Rearrangement of allyl phenyl ether over MCM-41*. **J. Catal.** 229 (2005) 105
5. S.G. Waghlikar, S.P. Mirajkar, S. Mayadevi, S. Sivasanker, *Rearrangement of allyl aryl ethers over zeolites*. In: E. van Steen, L. Callnan, M. Claeys, C.T. O'Conner (Eds.), Proc. 14th Int. Zeol. Conf., Cape Town, 25 – 30, April 2004. Studies in Surface Science and Catalysis 154 C (2004) 2731.
6. R. Nagotkar, S.S. Khaire, S. Mayadevi, and S. Sivasanker, *Alkylation of naphthalene with t-butanol over zeolite Y: Influence of environment and reaction kinetics*. **Indian J. Chem. Technol.** 11 (2004) 351
7. Rajaram Bal, S. Mayadevi, and S. Sivasanker, *O-Methylation of dihydroxybenzenes with methanol in the vapour-phase over alkali loaded SiO₂ catalysts: a kinetic analysis*. **Organic Process: Res. & Dev.** 7(1) (2003) 17

8. R.P. Marathe, S. Mayadevi, S.A. Pardhy, S.M. Sabne and S. Sivasanker, *Alkylation of naphthalene with t-butanol: use of carbon dioxide as solvent* **J. Molecular Catal.** 181, (2002) 201.
9. Ishwarya Mathew, S. Mayadevi, S. Sabne, S.A. Pardhey and S. Sivasanker, *Studies on isopropylation of naphthalene over zeolites* **Reaction Kinet. and Catal. Lett.** 74, 1, (2001) 119.
10. Ishwarya Mathew, Smita Sabne, S. Mayadevi, S.A. Pardhy and S. Sivasanker, *Isopropylation of naphthalene over large pore zeolites.* **Indian J. Chem. Tech.** 3 (2001) 469.
11. A.J. Patil, M.H. Shinde, H.S. Potdar, S.B. Deshpande, S.R. Sainkar, S. Mayadevi, and S.K. Date, *Chemical synthesis of titania (TiO₂) via mixed precursor route for membrane applications.* **Mater. Chem. Phys.** 68 (2001) 7.
12. S. Mayadevi, S.S. Kulkarni, A.J. Patil, M.H. Shinde, H.S. Potdar, S.B. Deshpande, and S.K. Date, *Controlled chemical precipitation of titania for membrane applications—effect of heat treatment and fabrication conditions on its performance.* **J. Mater. Sci.** 38 (2000) 3943
13. H.S. Potdar, S.B. Deshpande, S. Mayadevi, P.A. Joy, and S.K. Date, *Synthesis of ultra-fine TiO₂ powder by controlled hydrolysis of titanium tetrabutoxide.* **Indian J. Chem- Section A.** 38 (5) (1999) 468
14. S. Mayadevi, *Inorganic membranes – The membranes of the future.* **Indian Chem. Engr.** Section B 39 (2) (1997) 99
15. S. Mayadevi, *Adsorbents for the removal of fluorides from water.* **Indian Chem. Engr.** Section A 38 (4) (1996) 155 - 157
16. V.R. Choudhary and S. Mayadevi, *Adsorption of methane, ethane, ethylene and carbon dioxide on silicalite I.* **Zeolites** 17 (1996) 501
17. V.R. Choudhary and S. Mayadevi, *Sorption isotherms of methane, ethane, ethylene and carbon dioxide on ALPO-5 and SAPO-5.* **Langmuir** 12 (1996) 980
18. V.R. Choudhary, S. Mayadevi and A.P. Singh, *Simple apparatus for the gravimetric adsorption of liquid vapours on solid catalysts / adsorbents.* **Ind. Eng. Chem. Res.** 34 (1995) 413
19. V.R. Choudhary, S. Mayadevi and K.R. Kamble, *Adsorption of oxygen and nitrogen on ALPO₄-5 and SAPO-5 at moderate pressures using a novel adsorption / desorption method.* **Ind. Eng. Chem. Res.** 33 (1994) 1319

20. V.R. Choudhary and S. Mayadevi, *Adsorption of methane, ethane, ethylene and carbon dioxide on high silica pentasil zeolites and zeolite like materials using a gas chromatography pulse technique*. **Sep. Sci. Technol.** 28 (13 & 14) (1993) 2197
21. V.R. Choudhary and S. Mayadevi, *Adsorption of methane, ethane, ethylene and carbon dioxide on X, Y, L, and M zeolites using a gas chromatography pulse technique*. **Sep. Sci. Technol.** 28 (8) (1993) 1595
22. V.R. Choudhary, S. Mayadevi and D.B. Akolekar, *Influence of coke deposition on acidity, intercrystalline mass transfer and catalytic properties of Pt-H-ZSM-5. Al₂O₃ catalyst*. **J. Catal.** 144 (1993)
23. V. R. Choudhary, S. Mayadevi and S.G. Pataskar, *Influence of presence of Barium and alkali metals on sintering and oxygen chemisorption characteristics of silver catalysts*. **Advances in Catalysis, Science and Technology**, Ed., T.S.R. Prasada Rao, Wiley Eastern Ltd., New Delhi (1985) p. 143

6. Papers Communicated / Accepted for publication

1. Nikunj P. Tanna and S. Mayadevi. Analysis of a membrane reactor: Influence of membrane characteristics and operating conditions. International Journal of Chemical Reactor Engineering (Accepted)
2. S. Mandal and S. Mayadevi. Synthesis, characterization and study of adsorption behavior of Zn-Al layered double hydroxides for adsorption of fluoride from water. Applied Clay Sciences (Communicated)
3. A.N. Gokarn, S. Mayadevi. A novel process for the recovery of valuables from solid wastes. Accepted for publication in Sustainability Science and Engineering: Defining Principles, Ed. Martin A., Elsevier Amsterdam

7. Presentation in Symposia

1. J. Vijaya Kumar, S. Mandal, and S. Mayadevi, "Adsorption of Cresols on Alumina-based Adsorbents" The Indian Chemical Engineering Congress-2006
2. S. Mandal and S. Mayadevi, "Removal of fluoride from aqueous solutions by adsorption onto Zn-Al anionic clay", The Indian Chemical Engineering Congress-2006

3. N.P. Tanna, S. Mayadevi, and U.K. Kharul, "Polymer Catalyst for Organic Reactions" The Indian Chemical Engineering Congress-2006
4. S. Mayadevi and S. Mandal. Characterization and testing of activated alumina. Invited lecture, Consultation meeting on standards for activated alumina, jointly organized by United Nations Children's Fund (UNICEF) office for Rajasthan and Public Health Engineering Department (PHED) Rajasthan at Hotel Clarks Amer Jaipur, October 18, 2006
5. S. Mayadevi, "Catalytic membrane reactor." Invited lecture, International workshop on membranes and membrane reactors, CG & CRI, Kolkata, January 3-5, 2005
6. S.G. Waghlikar, S. Mayadevi, S.P. Mirajkar, and S. Sivasanker, "Rearrangement of allyl aryl ethers over zeolites" 14th International Zeolite Conference, jointly organized by the International Zeolite Association (IZA), and the Catalysis Societies of South Africa and India, Cape Town, South Africa, April 25 – 30, 2004
7. Nikunj P. Tanna and S. Mayadevi, "Performance analysis of a membrane reactor for reversible reactions" The Indian Chemical Engineering Congress-2003 and 56th Annual Session of the IChE, jointly organised by IChE, Orissa State Coordination and Regional Research Laboratory (CSIR), Bhubaneswar, India, December 19-22, 2003.
8. P.V. Surse, S. Waghlikar, S. Mayadevi and S. Sivasanker "Alkylation of anisole over zeolite catalyst: influence of alkylating agents and operating parameters" The Indian Chemical Engineering Congress-2003 and 56th Annual Session of the IChE, jointly organised by IChE, Orissa State Coordination and Regional Research Laboratory (CSIR), Bhubaneswar, India, December 19-22, 2003
9. S. Mayadevi and A.N. Gokarn, "A novel process for the recovery of valuables from solid wastes" Green Engineering: Defining the Principles, sponsored by ECI, AIChE, ASME, and SAE, held at Sandestin Resort, Sandestin, Florida, from May 18-22, 2003
10. A.N. Gokarn, P.A. Chapekar and S. Mayadevi, "Recent trends in economic treatment of spent-wash" technical presentation in the Golden Jubilee Convention 2001, The Deccan Sugar Technologist's Association (India), held at Pune in October 2001.
11. S. Mayadevi, R.P. Marathe, S.A. Pardhy, and S. Sivasanker, "Organic solvent-free catalytic alkylation of naphthalene with *tert*-Butyl Alcohol over RE-Y", oral presentation in International Symposium, CATSYMP-15 & IPCAT-2 held in NCL, Pune from 23-25 January 2001.

12. A.N. Gokarn and S. Mayadevi, "Treatment of industrial effluents into useful products", invited lecture in the National Seminar, "TREATWASTE-2001", held at LIT, Nagpur on 13th and 14th January, 2001.
13. B.P. Gadgil and S. Mayadevi, "New Trends in Esterification Reactions", National Workshop on Catalysis – Forays into Non-Traditional Areas, held at ICT, Hyderabad, India, January 7 – 8, 2000.
14. M.H. Shinde, A.J. Patil, S. Mayadevi, H.S. Potdar, S.B. Deshpande, and S.K. Date. "Characterization of Supported Zinc Oxide Membranes by Gas-Liquid Displacement Porometry" DAE-SSPS-99 symposium held at Kalpakkam, India December 20 – 24, 1999.
15. A.J. Patil, M.H. Shinde, H.S. Potdar, S.B. Deshpande, S. Mayadevi and S.K. Date. "Chemical synthesis of titania (TiO₂ powders) via mixed precursor route for membrane applications" DAE Solid State Physics Symposium held in Kurukshetra University, Haryana, India during December 27 – 31, 1998.
16. S. Mayadevi, S.S. Kulkarni, H.S. Potdar, S.B. Deshpande, and S.K. Date. "Chemically bound titania for membrane applications" The 5th IUMRS International Conference in Asia, IUMRS-ICA '98 held in IISc Bangalore, India. October 13 – 16, 1998.