

❖ **Research Collaboration :-**

1. Mr. Kiran D. Patil (**Research Student**)
2. Dr. M. S. Borse, (**Chemistry**), Uttamrao Patil College, Dahivel (**Research Guide**)
3. Dr. G.H. Sonawane (**Chemistry**) ASC College, Parola, District- Jalgaon, (**Research Co-guide**)

MEMORANDUM OF UNDERSTANDING (MOU)

BETWEEN

**NAVODAY SHAIKSHANIK SANSTA DHULE'S
UTTMRAO PATIL ARTS, & SCIENCE COLLEGE, DAHIWEL, TAL. SAKRI DIST.
DHULE**

AND

**KISAN VIDYA PRASARAK SANSTHA'S
KISAN ARTS COMMERCE SCIENCE COLLEGE, PAROLA, DIST. JALGAON**

THIS MEMORANDUM OF UNDERSTANDING (MOU) is executed at PAROLA on this 19th day of March, 2018 by and between Navoday Shaikshanik Sanstha Dhule's Uttmrao Patil Arts, & Science College, Dahiwel, Tal. Sakri Dist. Dhule and represented by its Principal Dr. B. D. BORSE, hereinafter referred to as 'UPASCD' (which expression shall, where the context so admits, mean and include its successors, representatives and permitted assigns) of the One Part; and Kisan Vidya Prasarak Sanstha's Kisan College, Parola, Dist. Jalgaon and represented by its Principal; DR. Y. V. PATIL, hereinafter referred to as 'KISAN' (which expression shall, where the context so admits, mean and include its successors, representatives and permitted assigns) of the Other Part (hereinafter collectively referred to as "the Parties" and individually as "the Party") WITNESSETH AS FOLLOWS:

WHEREAS, 'UPASCD' established in 1995, in tribal region of North Maharashtra being a reputed teaching institution in Arts, & Science, has well qualified and professional faculty members, and whereas **UPASCD** with its good teacher student ratio facilitates higher education for under graduates and research leading to publications, research activities and extension activities in view of its state of the art infrastructure and instrumentation facilities such as well equipped laboratories, NSS, and computerized library etc.

AND WHEREAS 'KISAN' which was established in 1971 and affiliated to KBCNMU, Jalgaon caters higher education in Arts, Commerce & Science faculty to the students in and around Parola and is a reputed teaching and research institution. It also runs skill- based Programmes in Software Development and Soil & Water Conservation which fall under the degree of Bachelor of Vocation (B. Voc.). It has well equipped laboratories and computerised library. It has University recognized research laboratories of Chemistry and Geography.

AND WHEREAS both the Institutions work with objectives to enhance quality of teaching and learning process, research and extension of services to the society at large and whereas both **UPASCD and KISAN** are convinced about the mutual benefit of forging formal linkage to develop collaborative teaching and research programmes in the areas of their core competence with special focus on Geography and Chemistry research;

NOW, therefore, in consideration of the premises and mutual covenants hereinafter contained, the parties hereto agree as follows:

Objectives of collaboration

- To collaborate and co-operate with each other in order to enhance the quality of teaching, training and research activities.
- To provide for exchange of students and other researchers of one institution with the other institution.
- To provide opportunities for both faculty members and students to use the expertise and facilities



available in both institutions through training of students/staff and through exchange of thoughts by brain storming sessions/seminars/workshops and conferences.

- To share research infrastructure and expertise available at **KISAN** with **UPASCD** under mutually agreed framework.
- To jointly publish research papers in reputed international journals.
- To work jointly for the common research interest at national and international level. This includes preparation of research proposals and their implementation as per the guidelines of funding agencies.
- To support the exchange of academic and training material including access to library and other digital resources of each other.
- To encourage any other activities that both the institutions agree to be of mutual benefit.

2.0. Areas of collaboration The Institutions herein have, after considering their objectives and strengths, agreed to work together and collaborate in the following areas of interest: Population Geography, Settlement Geography, Medical Geography, Agriculture Geography, Chemistry, Physics, Botany, Marathi.

Twinning Academic Programmes

To facilitate to run programmes in a twinning mode by exchanging faculties and students between **UPASCD** and **KISAN**.

Joint research programmes

UPASCD and **KISAN** may submit joint research proposals to national and international funding agencies in the areas of scientific and social science research. For this purpose, roles and responsibilities of participating faculty members will be finalized on mutual discussion between the parties hereto in advance and confirmed by exchange of communications.

The procedural aspects of collaboration including financial obligations of each of the parties hereto shall be finalized on mutual discussion in respect of each specific project under this MoU and a separate agreement containing specific terms and conditions therefore will be executed between the parties hereto.

Joint study programmes

Ph. D scholars working at **UPASCD** will be allowed to carry out a part of their research work (if required) at a selected Department in **KISAN**, vice-versa depending upon specific requirements.

Mobility of faculty members of **UPASCD** and **KISAN** and vice-versa for Ph.D. will be encouraged.

Besides Ph.D. programme, arrangement of joint study programme may also be considered at post-graduate level including credit sharing, subject to conditions as may be framed from time to time by statutory bodies.

Confidentiality

Both parties hereunder agree that any information disclosed by one party to the other while carrying out collaborative activities under this MoU shall be maintained as proprietary confidential information and will be disclosed only to the authorities as required in the relevant statutory regulations and to those persons in the recipient party's organization on a 'need to know' basis only.

All such proprietary confidential information will be kept in confidence and the party receiving the confidential information agrees not to disclose to any other person or persons outside the organization or any unauthorized person or persons except to the organization authorized by either of the parties hereunder on 'need to know' basis for the execution of the collaborative work.

Intellectual property rights (IPR) protection

IPR generated during the activities under the MoU shall be shared jointly. The extent of ownership shall be decided mutually depending upon the relative level of intellectual inputs made by the parties.

The expenditure incurred and to be incurred for the maintenance of IPR shall be borne by each party equally or in proportion to the extent of ownership as may be decided by authorized authorities of UPASCD and KISAN mutually.

Both parties shall not file any application for seeking IPR / patent in its own name or in the name of its associates or any other person(s) on any matter relating to the information developed under this MoU. However, they can seek intellectual property rights on joint names of the parties as may be mutually agreed, on case to case basis.

The above principles will apply to all the activities of IPR such as patenting, technology transfer and commercialisation of invention developed out of the activities covered under this MoU.

Publication

Publications, if any, in respect of the activities covered under this MoU shall be in the names of involved personnel from both parties. In all publications (papers, reports etc.) it will be duly acknowledged that the work has been carried out by UPASCD and KISAN under this MoU between the parties.

All ethical guidelines of research publication existent at both the Institutions will be followed strictly.

Financial Commitment

This MoU, being a co-operative and collaborative understanding for academic excellence and enhancement of quality of research activities, shall not create any legal and / or financial commitment whatsoever on either of the parties hereto, except as maybe provided in activity-specific agreement(s) that may be entered into subsequently.

Implementation and monitoring

The Steering Committee will monitor the progress of collaborative activities under the MoU on a yearly basis and compliance of the terms and conditions specified therefore and furnish a progress report to the top Management of each Institution at the end of each year.

Term and termination

This Memorandum of Understanding will be in force for a period of five years from the date of signing of the same and thereafter may be renewed for further period of five years subject to such other terms and conditions as may be mutually agreed upon.

Notwithstanding sub-clause 7.1., this MoU may be terminated by either party by issuing a two months notice in writing to the other party prior to the desired termination date. However, both parties agree that all continuing obligations to students, staff, funding bodies or other entities are met in full subsequent to the notice of termination.

Notices

All notices and other communications required to be served under the terms of this MoU, shall be considered to be duly served, if the same is delivered at or posted by registered mail addressed to the Principal, UPASCD at its office at Erandol and delivered at or posted by registered mail addressed to KISAN at Parola.



Miscellaneous

No modification to this MoU shall be binding unless it is made in writing and signed by both parties.

If any provision of this MoU is held by any Court or other competent authority to be illegal, void or unenforceable in whole or in part, this MoU shall continue to be valid in respect of the other provisions thereof.

Nothing in this MoU shall constitute, or be construed, a party as the partner, agent, employee or representative of the other party. Either of the Parties hereto must not act independently of the other party and does not have the right or power to commit the

other Party on any matter or incur any obligation on behalf of the other party without the prior written approval of the other party.

Each of the parties hereto agrees to comply with all laws applicable to the party concerned in respect of the activities undertaken in pursuance of this MOU.

IN WITNESS WHEREOF THE PARTIES HERETO HAVE EXECUTED THIS MOU ON THE DATES SET FORTH ABOVE.

(i) For and on behalf of Navoday Shaikshanik Sansta, Dhule's Uttmrao Patil Arts, & Science College, Dahiwel, Tal. Sakri Dist. Dhule

(ii) For and on behalf of Kisan Vidya Prasarak Sanstha's Kisan Arts Commerce and Science College, Parola,



[Signature]
PRINCIPAL

Uttamrao Patil Arts & Sci. College,
Dahiwel, Tal. Sakri Dist. Dhule



[Signature]
Principal

KVP8 Kisan Arts, Commerce & Science
College, Parola Dist. Jalgaon 425111

Witnesses:

1. *[Signature]*

Dr. M.S. Borse

2. *[Signature]*

Dr. Ahire S.C.

Witnesses:

1. *[Signature]* 13.3.2018

Dr. G.H. Sonawane

2. *[Signature]* 17.3.18

Dr. P.D. Patil



❖ Research Collaboration :-

1. Mr. Kiran D. Patil (**Research Student**)
2. Dr. M. S. Borse, (**Chemistry**), Uttamrao Patil College, Dahivel (**Research Guide**)
3. Dr. G.H. Sonawane (**Chemistry**) ASC College, Parola, District- Jalgaon, (**Research Co-guide**)

➤ **Research Center** : Registration Letter of Ph.D. Student



KAVAYITRI BAHINABAI CHAUDHARI NORTH MAHARASHTRA UNIVERSITY, JALGAON

Date : 25-06-2019

To,

Mr. KIRAN DHANANJAY PATIL

Subject:- Admission to Ph.D. Course in the Subject of Chemistry under the faculty of Science and Technology

Sir/Madam,

With reference to the above subject, this is to inform you that, you were provisionally registered for Ph.D. course in the subject to Chemistry under the faculty of Science and Technology. Now, after successful presentation of your research outline before RRC meeting and completing of Pre-Ph.D. Course work, the University authorities have confirmed your admission to Ph.D. course in the above subject and faculty. The particulars of your admission are as below :-

Registration Details		
a)	Name of Guide	Dr.Borse Mahendra Sahebrao
b)	Name of Co-guide (if any)	Dr. Gunwant H. Sonawane
c)	Place of Research Work	PAROLA
d)	Date of Registration	29-11-2019
e)	Date of Approval of Research Title (RRC)	13-02-2019
f)	Application No.	PHD-2017-MWBVSN
g)	Topic of Research	Impact of hydroxylated cationic gemini and its monomeric surfactant in mixed system in presence of various additives in aqueous medium

Paper	Paper I (Research Methodology)	Paper - II (Subject Specific Course)	Paper - III (Guide Course)
Grade	E	C	O

Note: -

1. **Rules and regulations regarding Ph.D. are as per UGC regulation, 2009 (Minimum Standards and Procedure for Awards of M.Phil/Ph.D. degree) and Ph.D. Guideline-2017 of Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon and fees will be applicable as stated in provisional registration letter.**
2. You are requested to apply for eligibility certificate to the Research section of this university within Six Months from the date of issue of this letter. The eligibility fee is Rs. 500/- and late fee of Rs. 1000/- will be charged if the candidate fails to apply for eligibility certificate within Six Months from the date of issue of this letter. To fulfill eligibility within one year from the date of issue of the letter is mandatory, otherwise your admission is liable to be cancelled. (Ph.D Guidelines -2017, Annexure-IV).
3. **Six Monthly Progress Report** : The students are required to upload their Six Monthly Progress report Online in Softcopy (PDF) format through their Login every six month. For this purpose, the login of the students will be opened for a period of one month after every six month. This softcopy will be submitted after the approval of guide. The Six Monthly progress Report should be submitted date to date in time i.e. from the date of approval of research title. (Ph.D. Guidelines 2017, Annexure- V).
4. The students are required to submit a copies of all Six Monthly Progress Reports signed and duly endorsed by guide at the time of permission for submission of synopsis in the University.
5. The candidate should pay tuition fee as well as other fees regularly in time. The fee structure and late fee, during the Process for Ph.D. degree will be as prescribed by the University authorities from time to time.
6. The candidate should submit a photocopy/ hard copy of this letter to the Research Section of the University immediately after the receipt.

Yours faithfully,

sd/-

Deputy Registrar
Research Section

Physical Chemistry

Kiran D. Patil, Gunavant H. Sonawane and Mahendra S. Borse*

Influence of *n*-alcohols on aqueous DTAB micelles studied by ultrasonic analysis

<https://doi.org/10.1515/tsd-2021-2387>

Received July 14, 2021; accepted September 20, 2021

Abstract: The influence of chain length of *n*-alcohols such as 1-butanol, 1-pentanol, 1-hexanol and 1-heptanol on cationic dodecyl trimethyl ammonium bromide (DTAB) micelles has been investigated. The effect of concentration was determined at alcohol concentrations of (10, 20, 30, 40 and 50) mM and at temperatures of 298.15 K, 303.15 K, 308.15 K and 313.15 K using ultrasonic velocity, density, viscosity and conductivity measurements. To study molecular interactions in micelles of various mixtures of DTAB and *n*-alcohols by using acoustical parameters, such as adiabatic compressibility (β_{ad}), intermicellar free length (L_f), acoustic impedance (Z), molar volume (V_M) have been calculated by using ultrasonic velocity (U) and density (ρ). With the help of the trends observed when varying these parameters, the molecular interactions and thus the micellar growth of mixed systems of DTAB and *n*-alcohol were discussed. Viscosity data such as absolute viscosity, viscous relaxation time, oil solubilization, foam stability and conductance data complemented the observed ultrasonic data.

Keywords: acoustic parameter; alcohol; density; micelles; oil solubilization; specific conductance; surfactant; ultra-

agents [1], for mineral flotation [2], as corrosion inhibitors [3], as phase transfer catalysts for regioselective addition reactions [4], for the synthesis of nanomaterials [5], as potential gene transporters [6] and as preservatives [7]. The fundamental properties of surfactants are their ability to adsorb at the interface and to form a variety of aggregates in solution. The physicochemical behaviour of surfactants in solution is strongly influenced by the molecular architecture of the surfactants and the presence of various additives [8–10].

An important reason for the better performance in a mixed system of a cationic surfactant and *n*-alcohols can be assumed in the crucial molecular–molecular interactions at different temperatures and concentrations [11]. The formation of aggregates and its dependence on the concentration and chain length of *n*-alcohols, as well as temperature, provide important acoustic parameters. Conductivity helps to understand the fundamentals and various applications based on the utility of surfactants in different fields such as agrochemical formulations, pharmaceuticals, dye removers, oil extraction, personal care products, etc. [12–14].

The effects of various additives on micelle growth have already been extensively studied. Alcohols are among the



Thermo Acoustic Studies of Mixed Surfactants (Brij-97 + DTAB) System in Presence of Various Additives

Pooja P. Patil¹, Mahendra S. Borse^{1*}, Kiran D. Patil¹, Rajendrakumar B. Ahirrao², Gunvant H. Sonawane³

¹Department of Chemistry, Uttamrao Patil Arts and Science College, Dahiwal, Taluka-Sakri, District-Dhule, Maharashtra, India.
mahendraborse@yahoo.com

²Department of Physics, Uttamrao Patil Arts and Science College, Dahiwal, Taluka-Sakri, District-Dhule, Maharashtra, India.
ahirraorb@gmail.com

³Department of Chemistry, Kisan Arts, Commerce and Science College, Parola, Dist-Jalgaon, Maharashtra, India.
drgunvantsonawane@gmail.com

Abstract: Thermo-acoustic parameters of mixed surfactant system (Brij-97 +DTAB) in presence of inorganic electrolytes NaCl, CaCl₂ and AlCl₃ and non-electrolytes, sucrose and dextrose at various concentrations. Cloud point (CP) of nonionic surfactant Brij-97 was observed to increase with the increase in concentration DTAB in binary mixed surfactant system. In the ternary system (Brij-97+DTAB + additives) CP of the mixed surfactant system was observe to increases at 10 Mm concentration but slowly decreases with an increase in the concentration of additives. CP of mixed surfactant system was strongly influence by the structure and ionic interaction of additives with micelle in aqueous solution. The clouding components release their solvated water and separate-out from the solution. Therefore, the CP of an amphiphile can be considered as the limit of its solubility. Considering the cloud point as threshold temperature of the solubility, the thermodynamic parameters of the clouding process (ΔG_{cl}^o , ΔH_{cl}^o and ΔS_{cl}^o) was evaluated using the "Phase Separation Model". The phase separation results from micelle-micelle interaction. It was found that the overall clouding process was exothermic and $\Delta S_{cl}^o > \Delta H_{cl}^o$, indicating that the process of clouding was guided by both enthalpy and entropy-driven.

Index Terms: Surfactants, Thermodynamic parameters, Cloud point, Brij-97, DTAB.

such as, Vander Waals, hydrogen bonding, hydrophobic, hydrophilic and electrostatic interactions (Alan, M.S., et al., 2015). Clouding is a well-known phenomenon and observed in non-ionic surfactants; upon raising the temperature, the system becomes cloudy and phase-separates at a well-defined temperature called as cloud point (CP). Aqueous solution of a water-soluble surfactant becomes turbid. Knowing the cloud point is an important for determining storage stability (Khan F., et al., 2012; Lee., B.H., 2017). In pharmaceutical drugs penetrating power enhancement and various formulations needs knowledge of cloud point. Generally, nonionic surfactant shows optimal effectiveness when use near or below their cloud point. Low-foam surfactants should be use at temperatures slightly above their cloud point. Cloud points are typically measured using various concentration range of aqueous surfactant solution, it can be measured Cloud point range for 0° to 100°C (32 to 212°F), limited by freezing and boiling point of water. Cloud point is characteristic properties helps to calculating thermodynamic parameters of nonionic surfactants (Borse M.S., 2004).

Clouding surfactants are more water soluble than that of



॥ तपसा संपन्ने सर्वम् ॥

Navoday Shaikshnik Sanstha Dhule's

Website: www.upcdahivel.ac.in
Email ID: upcdahivel@yahoo.co.in

Uttamrao Patil Arts and Science College

Dahivel, Tal-Sakri, Dist-Dhule.424304

Phone no. (Office): 02561230643

Affiliated to Kavyitri Bahinabai Chaudhari North Maharashtra University, Jalgaon.

Chairman Shri. Arvind M. Patil

Prin. Dr. S. C. Ahire (MA, M Phil Ph.d)

To,

Principal,
KVPS, Kisan Arts, commerce and science college,
Parola, Dist Jalgaon
425111

Sub: Regarding to permission to work in the Chemistry Research Laboratory of
Kisan College, Parola

Respected Sir,

My self Dr. M.S. Borse, working as Assistant Professor in Navoday Shaikshnik Sanstha Dhule, Uttamrao Patil Arts and Science College Dahivel and I am writing here for the utilization for research laboratory in your college. Sir, my Ph.D. student Mr Kiran Dhanjay Patil wants to work in your research laboratory for research purpose.

As our institutes signed MOU for the exchange of faculty and students, so I request to allow him to work in research laboratory for research purpose only.

Please consider this letter as a humble invitation and kindly revert back with a positive response.

Thanking you,

Regards,


Dr. M.S. Borse

Forwarded Though

Principal:


PRINCIPAL
Uttamrao Patil Arts & Sci. College
Dahivel, Tal.Sakri Dist.Dhule



Navodaya Shaikshani Sanstha, Dhule's

Ph. 02561-230643
www.upcollegedahivel.org
e-mail: upcdahivel@yahoo.co.in
College Code : 210068
Cust No. : 101100064

Uttamrao Patil Arts & Science College,

Dahivel, Tal. - Sakri, Dist. - Dhule- 424 304 (M.S.)

Out ward No.-UPCD/

Date : 25-07-2023

Appreciation Certificate

This is certified that, Mr. Kiran Dhanjay Patil, a registered Ph.D. student under the guidance of Dr. M.S.Borse and Co-guidance of Dr.G.H.Sonawane at University recognised Research centre KVPS Kisan Arts, Commerce and Science College Parola. He is working as part of faculty and students exchange programme between KVPS Kisan Arts, Commerce and Science College Parola, District-Jalgaon and NSSD's Uttamrao Patil Arts and Science College Dahivel, District-Dhule.

We greatly appreciate your efforts to make faculty and student exchange a success.

Thanking you




PRINCIPAL
Uttamrao Patil Arts & Sci. College
Dahivel, Tal.Sakri Dist.Dhule