

# CURRICULUM VITÆ

Family Name: **SALAGER**

Given Name: **Jean-Louis**

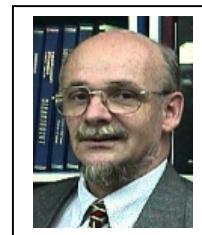
Born on May 22, 1944, in Montpellier, France  
French Citizen, married, two children

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## EDUCATION

High School Degree (Baccalauréat ès Sciences), Montpellier, France (1961)

BS in Chemistry, College of Sciences, Univ. of Nancy, France (1966)

BS in Chemical Process Engineering, ENSIC, Nancy, France (1967)

MSc. in Chemical Engineering (Optimization and Simulation), Univ. of Texas at Austin USA (1970)

PhD. in Chemical Engineering (Enhanced Oil Recovery), Univ. of Texas at Austin USA (1977)

Postdoctoral Fellow (EOR Physical-Chemistry), Univ. of Texas at Austin USA (1978)

## POSITIONS - TEACHING

> Teacher in the Physical-Chemistry Division (French Technical Cooperation) Universidad Industrial Santander, Bucaramanga, Colombia 1968-69

> Teacher in the Chemical Engineering School, from Assistant Professor (1970) to Professor (1983), and Emeritus Professor (since 1995), Universidad de Los Andes, Mérida, Venezuela.

> Professor, Graduate School in Chemical Engineering and Doctoral Program in Applied Sciences, Universidad de Los Andes, Mérida, Venezuela (since 1980)

> Invited Professor (from a week to a sabbatical year since 1987), Venezuelan-French Graduate Cooperation Program in different Universities in Montpellier, Pau, Lille and Compiègne, and ChE School in Toulouse and Nancy (all in France). Other temporary professorships: Universidad Central Ecuador (Quito), YKI-KTH University of Stockholm in Sweden, Tulsa University, University of Florida, Colorado School of Mines in USA.

## POSITIONS - ORGANIZATION and ADMINISTRATION (ULA)

> Founder of the Chemical Engineering School at Universidad de Los Andes, Mérida-Venezuela (5 year BS program), and its first director (1971-1975). Was in charge of preparing a learning program and supervising the creation of several laboratories. Was also in charge of recruiting teaching and research personal from scratch, mostly from abroad.

> Member of the Organizing Committee of the Master of Science Program in Chemical Engineering (1978-80).

> Founder (1978) and first Director of Laboratory FIRP (1978-2005). FIRP original meaning in Spanish is "Interfacial Phenomena and Petroleum Recovery"; current meaning since 2000 is "Formulation, Interfaces, Rheology and Processes" which indicates a broader area of work.

See more information in <https://firp-ula.org>

Lab FIRP has been outstanding in Venezuela for its uncommon organization. It included up to 25 professors and worked since its origin on both fundamental and applied science and technology. See later a special section describing FIRP Lab organization in two parts: one as a private company research center and one as a conventional university lab.

- > Founder and first director of the Graduate Specialist Program in Petrochemical Process Engineering (1990-93)
- > Founder and coordinator of the graduate program in chemistry (PPEQ) for industry participants (2004-06)
- > Member of the Organizing Committee of the PhD program in Applied Sciences, College of Engineering, Universidad de Los Andes, Mérida, Venezuela (1996-97).
- > Member of the Directing Committee of the PhD program in Applied Sciences, College of Engineering, Universidad de Los Andes, Mérida, Venezuela (since 2004)
- > Honorary Director of FIRP Laboratory (since 2007).

## **POSITIONS - INDUSTRY and COUNSELING**

- > Process Engineer, Process-Products Division, Elf-Union Refining, Paris France (1967-68)
- > Counseling Activities and in-house teaching/training for the following companies since 1985 (in Venezuela, unless otherwise stated):  
PETROLEOS de VENEZUELA and subsidiaries: INTEVEP Research/Development center, CORPOVEN, LAGOVEN, MARAVEN, PEQUIVEN. Other petroleum/petrochemicals companies: ELF-AQUITAINE (France), PETROBRAS CENPES Research Center (Brazil), CHEVRON-TEXACO TUCORE (USA), ENITECNOLOGIE R&D (Italy), BAKER-HUGHES (USA), PETROLITE (USA), PLUSPETROL (Peru), PERENCO (Peru, France, UK), TOTAL (France), ECOJETROL (Colombia), CEPESA (Spain), CENOVUS (Canada), CNRL (Canada), YPF (Argentina), FLOTEK (USA)  
Manufacturers of Surfactants, detergents, cosmetics, pharmaceuticals: HOECHST, ETOXYL, MAVESA (Venezuela), CLARIANT (Venezuela, Brazil), SEPPIC (France), PROCTER & GAMBLE (Venezuela, USA, Mexico, UK, Belgium), SANOFI (France), COGNIS (USA, Europe), RHODIA (France), UNILEVER (UK, Netherlands), AKZO-NOBEL (Sweden), VALEY (Brazil), SASOL (Germany), ECOLAB (USA), OXITENO (Brazil), GLAXO-SMITH-KLINE (UK), SC JOHNSON (USA), DSM (Netherlands), STIEFEL (USA), BASF (Germany), CEPESA Quimica (Spain), BELCORP (Colombia)  
Resins/latexes/paints: CORIMON, MONTANA, INTEQUIM, SHERWIN WILLIAMS  
Pulp and paper industries: SMURFITT-MOCARPEL, VENEPAL, MANPA  
Others: MAVESA, POLAR (Venezuela Foods), PECHINEY (France, aluminum), GIVAUDAN (Switzerland, perfumes), GTT (France, styrene foams), LAFARGE (France, cements)

## **EXPERIENCE in R & D and PROJECT MANAGEMENT**

R&D interest in Interfacial Phenomena, Formulation of Dispersed Systems containing Surfactants (Micro-Macroemulsions, and Foams). Applications to petroleum production and products, and other industries such as paints, cosmetics, foods and beverages, detergents, health care, cosmetics and pharmaceuticals.

- > Director of Lab. FIRP. Over 40 researchers have been typically associated with lab. FIRP, including 20 faculty members and 20 students. See <http://firp-ula.org/members/>
- > Head researcher of the following projects sponsored by the University Research Council CDCHT N° I-148 (1978-82), I-158 (1979-80), I-186 (1982-87), I-285 (1987-90), I-324 (1990-92), I-392 (1993-95), I-635 (1999-2003), I-834 (2005-2007) with the following topics: interfacial phenomena, micro- and macro-emulsions, enhanced oil recovery, emulsion inversion.
- > Head of 4 research projects sponsored by DGRST-France (1979-80-81-83) on Enhanced Oil Recovery Techniques and Heavy Oil Transportation. Interactions with research groups in France in the IFP.
- > Head of project FONINVES A-89, on petroleum production, sponsored by the Ministry of Petroleum and Mining - Venezuela (1982)

- > Head of a Lignosulfonates projet, jointly sponsored by a consortium of petroleum (PDVSA) and pulp and paper companies in Venezuela (1990-91)
- > Manager of CORPOVEN-ULA contract on Heavy Crude Oil Emulsions (1991-92)
- > Manager of ten R&D contracts (54 projects) between Universidad de Los Andes and INTEVEP (Research Center of the National Oil Company PDVSA), on micro- and macro-emulsions, foams and dispersions, heavy oil transport, dehydration during 1980-82, 1982-84, 1985-87, 1991-93, 1994-95, 1996-97, 1998-2000, 2000-03, 2002-2004.
- > Manager of a R&D projects on “Dispersed Systems” CONICIT grants N° 97003719 (1999-2002), N° 97000828 (2002-2004), N° 2000-0156 (2001-2004), N° 2000-1629 (2001-2005) and 2001-0156 (2001-2005)
- > Head of project “laminating emulsions” with PECHINEY (2001-2002)
- > Manager of a Technological Formation Contract on “Dispersion Science and Formulation”, with FONACIT, Ministry of Science and Technology, Venezuela (2004-05).
- > As a sum up of his role as Lab FIRP director in the years (1978-2005), it may be said that he was in charge of the management of research and development projects and contracts, and technical services, for more than 7 millions US\$.
- > After leaving the directorship of Lab FIRP in 2005, he was still a main scientist/adviser in 30 projects on emulsified and foaming drilling fluids, production and transport of heavy crude oils, emulsions of residual cuts, dehydration/desalting, polar oil micro-emulsions etc... for petroleum service companies out of Venezuela as Baker-Hughes, Weatherford, Schlumberger, Halliburton, BASF, Lipesa, Cenovus, Ecopetrol, Cepsa, Total etc.

#### **OTHER POSITIONS (ACADEMY and GOVERNMENT AGENCIES)**

- > Head of several Committees at Universidad de Los Andes: Scientific Committee (3 years) and Committee for Technological Development (2 years) of the University Research Council, Committee for Graduate Studies in Engineering (2 years).
- > Member of several Committees of the National Research Council (CONICIT): Research Promotion Committee PPI (1992-93 and 95-96), Committee attributing the research grants in Chemical, Materials and Mechanical Engineering (1990-93), National Petroleum Research Committee CONIPET (1997-2000).
- > Co-Manager (for Venezuela) of the French-Venezuelan Graduate Cooperation and Exchange Program PCP on Surfactants and Formulation of Dispersed Systems, Ministry of Science and Technology (1993-2006)
- > Member of the Board of Reagents of the National Research Council CONICIT Venezuela (1998-2001)
- > Member of the Board of Directors of the Venezuelan Foundation for Promoting Research (2000-2003)

#### **EDITORIAL POSITIONS**

- > Regional Editor for Latin America of the *Journal of Dispersion Science and Technology*, Marcel Dekker, New York (since 1986). Now owned by Taylor & Francis London UK.  
see <https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=ldis20> >
- > Member of the Editorial Board of *Current Opinion in Colloid and Interface Science*, Elsevier, (1996-2001)
- > Member of the Editorial Board of *Ciencia*, FEC University of Zulia, Maracaibo, Venezuela (since 1997)
- > Guest Editor of *Journal of Dispersion Science & Technology* – for a special volume on Emulsion Science and Technology in honor to Paul Becher (issues 1/3 of volume 23, 450 pages, 2002).  
See <https://www.tandfonline.com/toc/ldis20/23/1-3?nav=toCList>
- > Editor-in-Chief of the *Journal of Surfactants and Detergents*, American Oil Chemists’ Society USA, published by Springer Verlag Berlin Germany (2008-2014), then by Wiley since 2015. Emeritus editor-in-chief since then.  
see <http://www.springer.com/chemistry/journal/11743?detailsPage=editorialBoard>  
see <https://aocs.onlinelibrary.wiley.com/hub/journal/15589293/editorialboard.html>

#### **PROFESSIONAL and SCIENTIFIC SOCIETIES**

Current or past Member of the following Associations or Societies : American Institute of Chemical Engineers, American Oil Chemists’ Society, Société Chimique de France, Society of Petroleum Engineers, Sociedad Venezolana de Ingenieros Químicos, American Chemical Society, ASoVAC.

## **DISTINCTIONS**

Medal "Fray Ramos de Lora", Univ. de Los Andes (1985),  
Medal "Bicentenario", Univ. de Los Andes (1986), highest distinction from Univ. Los Andes  
Medal "Francisco de Miranda", Presidency of Venezuela (1991),  
Medal "Cuidad de Mérida", Mérida City (1992),  
Medal "Don Tulio Febres Cordero" Legislative Assembly Mérida State (1995)  
Listed in Marquis' Who's Who in the World (since 1999)  
Academic Palms, French Ministry of Education (2000)  
Member, Latin America Academy of Sciences (since 2002)  
Member, Simón Bolívar Chair (2005)  
Doctor Honoris Causa in Applied Sciences, Univ. de Los Andes (2008)  
Medal "Diego Carbonel Espinel" Univ. de los Andes (2013)  
Key of the City of Mérida (2013)

Ranking #1 among 300 top scientists in Venezuela according to Hirsch-index = 60 and 13,000 citations in the Google Scholar Citations Public Profile.

See <https://scholar.google.com/citations?user=pnuA8yoAAAAJ>

## **AWARDS**

Francisco de Venanzi Award in Chemistry, College of Sciences, Univ. de Los Andes (1993),

Natural and Exact Sciences Award (Chemistry), Fundacite Mérida (1995),

Simón Bolívar Award for Academic Accomplishment, University Simón Bolívar FAPUV (1997) highest academic award in Venezuela

National Scientific Prize (First time in Technological Research). CONICIT (1997) highest scientific award in Venezuela, handed by the President of the Republic of Venezuela.

Annual Award for the best Technological Research, Fundacite Mérida (2002)

Annual Prize (in Chemistry) of the Venezuelan Academy of Physical, Mathematical and Natural Sciences (2003)

Award as coauthor of the best technical paper published in 2014 in the Journal of Surfactants and Detergents (handed at the 106th Technical Meeting AOCS, Orlando, May 2015) sponsored by the American Cleaning Institute.

Award as coauthor of the best technical paper published in 2018 in the Journal of Surfactants and Detergents (handed at the 110th Technical Meeting AOCS, St Louis, May 2019) sponsored by the American Cleaning Institute.

AOCS 2020 Samuel Rosen Memorial Award to recognize accomplishments in industrial surfactant chemistry R&D, to be received at the 111<sup>th</sup> AOCS meeting in Montreal-Canada, 2020... but postponed to 2021.

See <https://www.lipidsfatsoilsurfactantsohmy.com/2020/07/samuel-rosen-memorial-award-feature.html>

or <https://firp-ula.org/2020/10/15/profesor-jean-louis-salager-recibe-el-premio-en-memoria-de-samuel-rosen/>

## LANGUAGES

Fluent in English, French and Spanish.  
High school notions in Italian, Portuguese, German and Russian

## Venezuelan Foundation for Scientific Research

Classified Senior Researcher (top level PPI = “Programa Promoción Investigador” while existing) 1990-2008.

## TEACHING

### Undergraduate and Graduate Courses - Universidad de los Andes (Mérida Venezuela)

Physics II, General Chemistry II, Analytical Chemistry, Mathematics I, Thermodynamics I, Chemical Reaction Engineering, Process Dynamics and Control, Surfactants and Applications, Advanced Mathematics, Petroleum Refining, Interfacial Physical Chemistry (graduate), Surfactants and Interfacial Phenomena (graduate), Petroleum Technology (graduate), Petrochemical Processes (graduate), Process Analysis (graduate), Conversion Processes

### Short Courses and Seminars (other Universities in Venezuela, USA, France, Sweden and Equator)

Numerical Methods, Stochastic Processes, Linear and non-linear Optimization, Geometrical Optics, Surfactants and Emulsions (College of Pharmacy), Applied Catastrophe Theory (graduate), Formulation of Surfactant-oil-water systems, Formulation and Properties of Emulsions.

### Continuous Education know-how training Courses for people working in industry (3-5 days):

Teaching of over 250 courses on surfactants and applications, formulation of emulsions, rheology and stability of emulsions, drop size analysis, foams, interfacial phenomena, in 14 countries for over 2500 people. See later partial listing of the companies.

**Course as invited professor** in Universities of Pau, Montpellier 2, Lille, Compiègne, Nancy, and Toulouse (PCP Program in France), Universities of Tulsa, Florida in Gainesville, Colorado School of Mines in Golden (USA), YKI University of Stockholm (Sweden), Central University of Equator in Quito. They were specialized and continuous education courses mostly for graduate programs on surface phenomena, physicochemical formulation, emulsions, foams and dispersions, in EOR, petroleum dehydration/desalting, and other applications.

**Short seminars on R&D managements for researchers** in universities and small industries (organized by the Ministry of Science and Technology MCT-CNTQ): University-industry synergy — problems and solutions for innovative cooperation.

## RESEARCH SUPERVISION or CO-SUPERVISION

~ 100 BS Thesis (Chemical Engineering, Chemistry, others). See complete listing in CV in Spanish  
~ 70 Master's Thesis and PhD Dissertations or postdoc research (Chemical Engineering, Physical-Chemistry, Formulation, Oil Recovery and Transport). See complete listing in CV in Spanish.

## PUBLICATIONS

### TEACHING HELP BOOKLETS typically with 20-30 pages (Cuadernos FIRP in Spanish and Cahiers FIRP in French)

~ 60 items in R&D topics (surfactants, interfacial phenomena, formulation, micro/macroemulsions, foams) see in Spanish <https://es.firp-ula.org/tesoro/cuadernos/> or in English <https://firp-ula.org/treasure/booklets/>

~ 20 items in undergraduate and graduate teaching (chemical and process engineering).

**ARTICLES, COMMUNICATIONS and PATENTS in research and development domains: surfactants, interfaces, formulation, micro/macro/nanoemulsions and foams, petroleum, cosmetics, medicines, food etc**

More than 500 publications and communications:

- ~ 20 Chapters in international books, handbooks, or enciclopedias
- ~ 250 Articles in Journals or published Proceedings.
- ~ 250 Oral communications to congress, symposia and other national and international meetings
- 7 US Patents
- 1 Edited book (450 pages) see reference 236 (2002)

**LISTING OF PUBLICATIONS, COMMUNICATIONS and PATENTS**

- 1) WADE W. H., MORGAN J., SCHECHTER R. S., JACOBSON J., SALAGER J. L., Interfacial tension and phase behavior of surfactant systems, paper SPE 6844, *52nd Annual Fall Techn. Conference SPE*, Denver, Oct. 1977, published in *Soc. Pet. Eng. J.*, **18**: 242-252 (1978)
- 2) SALAGER J. L., BOURREL M., SCHECHTER R. S., WADE W. H., Physico-Chimie de la Récupération assistée du Pétrole par solutions micellaires: Récents développements, *Bull. CREP*, **2** (2): 399-417 (1978).
- 3) SALAGER J. L., La récupération assistée du pétrole - Méthodes chimiques: tensio-actifs, alcalins et polymères, *Symposium ACC RAP*, DGRST, Paris, Jan. 1978.
- 4) BOURREL M., SALAGER J. L., SCHECHTER R. S., WADE W. H., Formulation optimum des systèmes micellaires pour la récupération assistée du pétrole: Comparaison des tensioactifs anioniques et nonioniques, *Colloques Nat. CNRS "Physicochimie des composés amphiphiles"*, **938**: 337-343 (1978)
- 5) SALAGER J. L., La récupération assistée du pétrole : L'effort de recherche industriel et universitaire aux USA, *fascicule DGRST*, April 1978
- 6) BOURREL M., SALAGER J. L., LIPOW A., SCHECHTER R. S., WADE W. H., Properties of amphiphile-oil-water systems at optimum formulation for phase behavior, paper SPE 7450, *Preprints 53rd Annual Fall Technical Conference SPE.*, Houston, Oct. 1978
- 7) SALAGER J. L., MORGAN J., SCHECHTER R. S., WADE W. H., VASQUEZ E., Optimum formulation of surfactant-oil-water systems for minimum tension and phase behavior, *Soc. Petrol. Eng. J.*, **19**: 107-115 (1979).
- 8) SALAGER J. L., BOURREL M., SCHECHTER R. S., WADE W. H., Mixing Rules for optimum phase behavior formulation of surfactant-oil-water systems, *Soc. Petrol. Eng. J.*, **19**: 271-278 (1979).
- 9) SALAGER J. L., Físico-química de los sistemas surfactante-agua-aceite: aplicaciones a la recuperación del petróleo, *Revista Instituto Mexicano Petroleo*, **11**: 59-71 (1979)
- 10) WADE W. H., VASQUEZ E., SALAGER J. L., EL-EMARY M., KOUKOUNIS Ch., SCHECHTER R. S., Interfacial tension and phase behavior of pure surfactant systems, 52nd Colloid & Surface Symp. ACS., Knoxville, mayo 1978, published in *Solution Chemistry of Surfactants*, K. Mittal, Ed., Vol. **2**: 801-817, Plenum Press (1979)
- 11) THURSTON G., SALAGER J. L., SCHECHTER R. S., Effect of salinity on the viscosity and birefringence of microemulsion systems, *J. Colloid Interface Sci.*, **70**: 517-523 (1979).
- 12) BOURREL M., SALAGER J. L., SCHECHTER R. S., WADE W. H., A Correlation for Phase Behavior of Nonionic Surfactants, *J. Colloid Interface Sci.*, **75**: 451-461 (1980)
- 13) SALAGER J. L., QUINTERO L., RAMOS E., ANDEREZ J., Properties of surfactant-oil-water emulsified systems in the neighborhood of three-phase transition, *J. Colloid Interface Sci.*, **77**: 288-289 (1980)
- 14) ANDEREZ J., GROSSO J. L., SALAGER J. L., VILLABONA J., Físico-química, reología y transporte de los sistemas surfactante-agua-aceite, *XIV Congreso Latinoamericano de Química*, San José, Costa-Rica (1981)
- 15) SALAGER J. L., GROSSO J.L., ESLAVA M. A., Flow Properties of emulsified surfactant-oil-water systems near optimum formulation, *II Seminario Internacional sobre Avances en Recuperación Mejorada de Crudo*, INTEVEP 1981, published in *Revista Tecnica INTEVEP*, **2**: 149-154 (1982).
- 16) SALAGER J. L., LOAIZA-MALDONADO I., MIÑANA-PEREZ M., SILVA F., Surfactant-oil-water systems near the affinity inversion - Part I: Relationship between equilibrium phase behavior and emulsion type and stability, *J. Dispersion Sci. Technology*, **3**: 279-292 (1982).

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- 17) SALAGER J. L., MIÑANA-PEREZ M., ANDEREZ J., GROSSO J., ROJAS C., LAYRISSE I., Surfactant-oil-water systems near the affinity inversion - Part II: Viscosity of emulsified systems, *J. Dispersion Sci. Technology*, **4**: 161-173 (1983).
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- 18) SALAGER J. L., ANTON R.E., Physico-chemical characterization of a surfactant: A quick and precise method, *J. Dispersion Sci. Technology*, **4**: 253-273 (1983).
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- 19) SALAGER J. L., MIÑANA-PEREZ M., PEREZ-SANCHEZ M., RAMIREZ-GOUVEIA M., ROJAS C., Surfactant-oil-water systems near the affinity inversion - Part III: The two kinds of emulsion inversion, *J. Dispersion Sci. Technology*, **4**: 313-329 (1983).
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- 20) MIÑANA-PEREZ M., ANTON R. E., JARRY P., SALAGER J. L., Emulsiones: Aspectos físico-químicos, *IIº Congreso de Ciencias Farmacéuticas*, Caracas, noviembre 1984
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- 21) SALAGER J.L., Applications of Catastrophe Theory to surfactant-oil-brine equilibrated and emulsified systems, *5th International Symposium "Surfactants in Solution"*, Bordeaux, France, July 1984
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- 22) JARRY P., MIÑANA-PEREZ M., SALAGER J. L., Inversion of Surfactant-Oil-Brine emulsified Systems: Generalized mapping and property transitions, *5th International Symposium "Surfactants in Solution"*, Bordeaux, France, July 1984
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- 23) GROSSO J., LAYRISSE I., GONZALEZ J., SALAGER J. L., VILLABONA J., La Influencia de los parámetros fluido-mecánicos y físico-químicos en la formación de emulsiones, *Revista Tecnica INTEVEP*, **5**: 3-8 (1985).
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- 24) SALAGER J. L., Phase behavior of amphiphile-oil-water systems related to the butterfly catastrophe, *J. Colloid Interface Sci.*, **105**: 21-26 (1985).
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- 25) ANTON R. E., SALAGER J. L., An Improved graphic Method to Characterize a Surfactant, *J. Dispersion Sci. Technology*, **6**, 245-253 (1985)
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- 26) SALAGER J. L., Thermodynamics-based model to interpret the phase behavior of surfactant-oil-brine systems near optimum formulation, *Iº Simposio Internacional sobre Recuperación Mejorada de Crudos (I SIREMCRU)*, Maracaibo, Venezuela, Feb 1985
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- 27) ANTON R. E., ANDEREZ J., SALAGER J. L., Properties of three-phase Surfactant-Oil-Brine dispersed Systems, *Iº Simposio Internacional sobre Recuperación Mejorada de Crudos (I SIREMCRU)*, Maracaibo, Venezuela, Feb 1985
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- 28) VILLABONA J., BRACHO C., SALAGER J. L., Transporte de emulsiones surfactante-agua-ceite. Parte I: Problema y alternativas de transporte de los crudos pesados de la Faja del Orinoco, *Ciencia e Ingeniería*, **17**: 53-61 (1985)
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- 29) BRACHO C., VILLABONA J., SALAGER J. L., Transporte de Emulsiones surfactante-agua-aceite - Parte II: Influencia de los parámetros físicos sobre la reología de las emulsiones, *Ciencia e Ingeniería*, **17**: 63-70 (1985)
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- 30) ANTON R. E., CASTILLO P., SALAGER J. L., Inversion de emulsiones por efecto de la temperatura, *Ciencia e Ingeniería*, **17**: 143-149 (1985)
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- 31) SALAGER J. L., Aplicaciones de la teoría de las catástrofes a los sistemas surfactante-agua-aceite, *Ciencia e Ingeniería*, **17**: 103-119 (1985)
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- 32) MIÑANA de PEREZ M., JARRY P., SALAGER J. L., Sistemas surfactante-agua-aceite: comportamiento de fase al equilibrio y propiedades de las emulsiones, *Ciencia e Ingeniería*, **17**: 121-136 (1985)
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- 33) VILLABONA J., BRACHO C., SALAGER J. L., Transporte de emulsiones surfactante-agua-ceite. Parte III: Influencia de los parámetros fisicoquímicos, *Ciencia e Ingeniería*, **17**: 256-263 (1985)
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- 34) SALAGER J. L., MOSQUERA F., Efecto de la temperatura sobre el comportamiento de fase de los sistemas con surfactantes noiónicos, *Ciencia e Ingeniería*, **17**: 217-222 (1985)
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- 35) ANTON R. E., MOSQUERA F., SALAGER J. L., Efecto de la temperatura sobre el comportamiento de fase de los sistemas surfactante-agua-aceite conteniendo una mezcla aniónica- noiónica, *Ciencia e Ingeniería*, **18**: 1-9 (1985)
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- 36) SALAGER J. L., Uso de los surfactantes en la industria petrolera, *Ciencia e Ingeniería*, **18**: 85-102 (1985)
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- 37) RABAGLIATI F., FALCON A., GONZALEZ D., MARTIN C., ANTON R. E., SALAGER J. L., Polymerization of styrene in low interfacial tension microemulsion-oil-water three-phase systems, *J. Dispersion Sci. Technology*, **7**: 245-258 (1986).
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- 38) ANTON R. E., SALAGER J. L., Emulsion instability in the three-phase behavior region of surfactant-alcohol-oil-brine systems, *J. Colloid Interface Sci.*, **111**: 54-59 (1986).
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- 39) MIÑANA-PEREZ M., LOPEZ-CASTELLANOS G., SALAGER J. L., Property trends and guidelines to formulate emulsified systems containing hydrocarbons and triglyceride oils, *14th International Congress Federation Societies of Cosmetic Chemists*, Barcelona, Spain, Sept. 1986, Preprints, vol. **2**: 629-642.
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- 40) ANTON R. E., CASTILLO P., SALAGER J. L., Surfactant-oil-water systems near the affinity inversion - Part IV: Emulsion Inversion Temperature, *J. Dispersion Sci. Technology*, **7**: 319-329 (1986).
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- 41) MIÑANA M., JARRY P., PEREZ-SANCHEZ M., RAMIREZ-GOUVEIA M., SALAGER J. L., Surfactant-oil-water systems near the affinity inversion - Part V: Properties of emulsions, *J. Dispersion Sci. Technology*, **7**: 331-343 (1986).
- 42) BREUL T., SALAGER J.L., MONSALVE A., Poder espumante y estabilidad de sistemas multifásicos salmuera-aceite-surfactante-alcohol, *XXXVI Convención AsoVAC* (1986)
- 43) SALAGER J. L., Applications of Catastrophe Theory to Surfactant-Oil-Brine equilibrated and emulsified systems, in *Surfactants in Solution*, K. Mittal & P. Bothorel Eds., vol. **4**: 439-448, Plenum Press (1987).
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## **SPECIAL SECTION TO SHORTLY DESCRIBE the lab FIRP ORGANIZATION**

When Lab FIRP was created by J.L. Salager in 1978, it was built up as a special organization. See <https://firp-ula.org/> and <https://firp-ula.org/the-laboratory/history/>

About 50% of FIRP Lab research has been dedicated to create know-how to solve problems to industrial partners in Venezuela and abroad, just as a private company research & technology center would do. This half of FIRP Lab mostly produced confidential R&D reports, a very few technical papers and some patents. One of its most famous work was its contribution in developing the "Orimulsion" with Petroleos de Venezuela PDVSA, i.e. an emulsion of heavy crude oil for long distance transport of viscous crude and fuel use.

FIRP lab is also well known worldwide for developing surfactant-oil-water formulation techniques with the innovation of the HLD equation (hydrophilic-Lipophilic-Deviation) for many applications from petroleum production like enhanced oil recovery and crude dehydration, to food, paints, pharmaceuticals, detergents and personal care products. This 50% of essentially contracted works has been producing the financial capacity to carry out the other 50% of the lab work, which is dedicated to usual research activities and academic teaching.

In the past 15 years Lab. FIRP has been developing an oscillating spinning drop interfacial rheometer which is the only apparatus to measure the dilational properties of the interface surfactant film at optimum formulation. This equipment is unique, and can be obtained from Lab FIRP at a much cheaper cost than from the companies that have copied it in the past decade. According to studies supported by well-known international scientists like Dominique Langevin, the interfacial rheometer allows to measure the real and imaginary components of the dilational modulus and its phase angle at a very low tension, something that cannot be done with the typical pendant drop equipment. This unique equipment allows to measure the interfacial rheology at the point where the emulsion stability is minimum, i.e., where the crude oil dehydration/demulsification is carried out. It permits to attain original information on the efficiency of a chemical demulsifier formulation.

Some open access review information, including with the use of crude oils, has been published recently in an article from Marquez et al (<https://doi.org/10.3390/colloids5030042>) and it allows to understand some knowledge and know how that Lab FIRP has developed in the past years.

This FIRP lab conventional investigation has been outstanding in Venezuela, producing over 350 thesis and dissertations (see <https://es.firp-ula.org/tesoro/tesis/>) and over 700 articles and congress communications. See <https://firp-ula.org/treasure/publications/>

This attained self-sustained organization allowed FIRP Lab to work normally in the past 20 years, in spite of essentially no significant research funding available from the university or Venezuelan government agencies.

It should be remarked that this lab FIRP very efficient organization of about 40 people working together has been particularly uncommon in Latin America. Studies (in books and thesis – available on request) indicated that it is probably because FIRP Lab functioning involves not only scientific issues, but also psychological motivation and sociological aspects (called model 2 from Argyris and Schon) which are generally ignored in university organization.

See <https://www.urbe.edu/UDWLibrary/InfoBook.do?id=4641>

It should be noted too, that the decisions taken in Lab FIRP for R&D contracts are like those coming from a private research center rather than a classical university in Latin America, i.e. they are according to three primary criteria dealing with the value of the work : (1) usefulness of the possible results, (2) scarcity of the used know-how in research groups, and of course – but as third one – (3) top excellence in scientific and technological aspects.

It is worth noting that the fact that FIRP Lab has been still functioning very well since the founder has left the direction 15 years ago (and in spite of considerable difficulties in Venezuela economy) is an extremely satisfactory result, because it means that its director and sub-director (Johnny Bullón and Ana Forgiarini) have been extremely efficient in using the previous experience, an uncommon situation in the venezuelan universities when the founder of a high performance laboratory resigns.