



## **PhD PROFESSOR IOAN V. NICOLESCU – REMARKABLE PERSONALITY OF THE ROMANIAN CHEMISTRY**

*“In science, more than in any other domain,  
researching the past is necessary in order  
to understand the present and control the future”*

*J.D. Bernal*

Indeed, any scientific community, in its ascending evolution on the bench of knowledge, is naturally preoccupied with its history, its past, and its ancestors' creations, thus searching to better understand them in order to create its own path in the future.

Recalling the past of the heterogeneous catalysis we visualize the remarkable personality of PhD professor I.V. Nicolescu, the person that laid the foundation of this research in our country and from whose birth we celebrate 100 years.

Professor I.V. Nicolescu's activity has powerfully marked the scientific life of the institutions he has worked in, and all that because he used to have his own working style, a deliberateness and balance that harmoniously integrated with his constant desire for change. He has promptly tackled different problems, in a realistic, concrete, and creative manner, being always ready for what the future had to offer.

Those of us that are familiar with his activity as founder of the Romanian heterogeneous catalysis school remember the obstacles he had to obviate, the great difficulties he had to overcome, and, last but not the least, his sacrifices in order to achieve his goal.

Wilhelm Ostwald, one of the founders of the catalysis on a global level and the first chemist to ever be awarded a Noble prize for his papers in the domain of the catalysis in 1909, in his book “Grosse Männer,” divided the scientific personalities into two categories: classics and romantics. Judging by his creation and the scientific legacy he has left us, professor I.V. Nicolescu can be considered a romantic, because only a romantic can dream and actually overcome the obstacles he has to face in order to achieve his goals. For all of us, he was and still is an eloquent example because of the manner in which he succeeded to reach his goals during the hard times our country had to offer soon after the war, times tormented by political and social changes.

In 1949, at the initiative of academician Gh. Spacu, the Chemistry Research Department of the Romanian Academy became the Chemistry Research Centre. At that time, The

Catalysis Team, led by I.V. Nicolescu, used to function within the General Chemistry department. Ala Modestinu-Nicolescu, Al. Papia, I. Moldoveanu, Ortansa Laudauer, Cristina Fordea, M. Spinizi and Antoaneta Suceveanu have been his first collaborators. Maria Gruia, Violeta Dumitrescu and Mariana Dardan subsequently have joined the group. The abovementioned team has developed its activity within the Technological Chemistry labs of the Faculty of Chemistry, University of Bucharest. This was the time when close collaboration relationships established in a favourable time for the far-reaching researches.

From the very beginning, the approached subjects have situated at the level of the heterogeneous catalysis researches developed by prestigious teams, with a prolific tradition in this domain, and aimed both the preparation of performant catalysts and the elaboration of catalytic processes. The researches that were carried out aimed the elaboration of scientific criteria for the optimal selecting, preparing, and using the catalysts, including the industrial reactors.

Meanwhile, in 1963, because of the overlong range of the approached researches, the Chemistry Research Centre of the Romanian Academy divided into three independent units, corresponding to the fundamental fields of chemistry:

- The Inorganic Chemistry Centre;
- The Organic Chemistry Centre;
- The Physical Chemistry Centre.

Under these conditions, the team led by I.V. Nicolescu continued its fruitful activity within the Catalysis Section of the Organic Chemistry Centre.

Also in 1963, in the new Physical Chemistry Centre, academician I.G. Murgulescu brought into the scope of the research the problem of the “Surface phenomena in the heterogeneous catalysis.” The main idea of these studies was that the absorption of the surface gases stage precedes and can decisively influence the proper catalytic reaction. As a matter of fact, the decisive step in studying the catalytic act by physical chemic methods was made by Langmuir who, on April 21, 1915, was writing in his lab notebook the followings:

1. The metal surface contains spaces in accordance to the surface network.
2. Adsorption films consist of atoms and molecules held by atoms that form the surface network by means of chemical forces.

In 1967, starting from these concerns common both to the Organic Chemistry Centre and the Physical Chemistry one, the Chemical Sciences Section of the Romanian Academy decided to transfer the Catalysis Section from the Organic Chemistry Centre to the Physical Chemistry Centre, where a Chemical Kinetics and Catalysis Section formed of two chemical kinetics laboratories and two catalysis ones, out of which one of Chemical Adsorption and one of Catalysis and Catalysts, were established. For a short while, professor I.V. Nicolescu has been the head of this section, then Ala Nicolescu succeeded him, being the chief of the section until her retirement in 1977. Subjects of great interests were brought to the attention of the new section, subjects that have been tackled before, under professor Nicolescu’s direction, by the Catalysis Section of the Organic Chemistry Centre.

Researches regarding the correlation between the genesis, the properties and the catalytic activity of some alumina or some metal-support type catalysts such as Ni/Al<sub>2</sub>O<sub>3</sub>, Cr/Al<sub>2</sub>O<sub>3</sub>,

Pd/Al<sub>2</sub>O<sub>3</sub> or V<sub>2</sub>O<sub>5</sub>/Al<sub>2</sub>O<sub>3</sub> have begun. The spinel oxidic catalyses have been also taken into consideration. The interdependency between the physical and chemical properties of the base and the active component has been studied, also the role of the specific surface into the catalytic reaction, the nature of the surface donor or acceptor centres, the link between the electrical phenomena and the catalytic activity and also the textural properties of the solid catalysts. Thus, there have been studied the following catalytic processes: the dehydrogenation of the n-alkane, the oxidehydrogenation of butanes to butadienes, the reforming of hydrocarbons, oxidizing the alkylbenzenes and the alkenes, alcohols isomerisation on acid solid catalysts, the desulphuration of methane and the demercaptanization of benzenes, the synthesis of the ammonia and also a series of selective Fischer-Tropsch syntheses.

Important information regarding the interactions between reactants and the surface of the catalysts have been obtained as a result of studying the variation of the reaction rate related to the chemical composition and the physical condition of the catalysts. These results have had a real contribution in deciphering the mechanism of the heterogeneous catalysis and in elaborating and improving some industrial processes of chemically processing the hydrocarbons or the mineral oils.

At the same time, the mechanical topochemic process for preparing the oxidic supports and catalysts has been discovered. As a result, in 1974, the team from the Physical Chemistry Centre led by I.V. Nicolescu has won the "Gh. Spacu" award of the Romanian Academy for "The mechanical topochemic process of synthesizing some industrial catalysts." The awarded team had the following members: professor I.V. Nicolescu, Ala Nicolescu, Cristina Fordea, G. Musca, Mariana Dardan-Urea and Antoaneta Spinzi.

Decision no. 2910/1967 of the Council of Ministers has assigned the Physical Chemistry Centre the right of awarding the title of Doctor of Chemistry. Professor Nicolescu is one of the persons to whom this right have been given, in the domain of "Heterogeneous catalysis in organic chemistry." Hence the researchers from the lab have become professor Nicolescu's graduands. In 1972, some of them were taken in hand by Dr. Ala Nicolescu, a specialist in "Catalysis and catalytic processes."

Among the first thesis conducted by I.V. Nicolescu, we will mention the one held by Maria Gruia in 1971, called "The study of the textural, structural, and catalytic properties of some alumina prepared in the presence of tensioactive modifications."

Professor Nicolescu has been also interested in the first stage of the catalytic process, namely the surface gases adsorption, and thus, under his direction and guidance, in 1974, Al. Fruma holds his thesis called "Doped alumina – support for the platonic catalysts. Study of the adsorbent properties of the active component's dispersion."

Professor I.V. Nicolescu has played a very important role in guiding and leading the scientific activity within the Physical Chemistry Centre during 1967-1972, as a member of the scientific council.

During 1-15 September 1967 period, the Romanian Academy, through the Physical Chemistry Centre and having the support of the interested ministries, organized in Bucharest the "Seminar of heterogeneous catalysis." The seminar had as a goal informing the researchers from the institute departments and factory labs about the actual stage of the heterogeneous catalysis researches both from a theoretical and an applicative point of view.

The 19 lessons, multiplied and distributed to all the participants, were held within the following cycles:

- Cycle I: Chain reactions
- Cycle II: Gases chemisorption on metals and semiconductors
- Cycle III: The properties of catalysts and the catalytic processes
- Cycle IV: Theories of the heterogeneous catalysis

The lessons were held by professor Nicolescu and his collaborator at the centre he was in charge of.

From 8th to 10th May 1969, in Sinaia, the Physical Chemistry Centre in collaboration with the University of Bucharest, the National College of Engineers and Technicians, the Ministry of the Chemic Industry and the Ministry of Mines, Oil and Geography have organized a symposium having as a main theme “The Catalysts used in the chemical and oil industry”, where professor Nicolescu and his collaborators done their one bit.

On memory lane, many of you present find I.V. Nicolescu, the professor with a sound voice and an aquiline look in his eyes, I.V. Nicolescu the researcher that used to share his innovative scientific ideas, his technological practice, and his life experience. He has taught his students and collaborators to be perseverant, meticulous, to have the scientific harshness; he has given them the courage necessary to the solitary researcher that knocks at the door of the unknown.

The professor is one of those truly great people that:

- we consider a good belonging to us all;
- succeed to make us believe they are our equals;
- give everything and do not ask for nothing back;
- we value only after they are gone.

The spirit of the great personalities profoundly penetrates the conscience of their fellows, coming down as a gift from generation to generation.

Professor I.V. Nicolescu – remarkable personalities of the Romanian chemistry from the second half of the 20th century, the undoubted father of the heterogeneous chemistry in our country – is one of those persons for whom the descendants have the spiritual duty to carry on painfully the torch, with devotion and love, on the path he has created.

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