European Journal of Technical and Natural Sciences 2026, No 3
ISSN 2414-2352

PREMIER Publishing
ppublishing.org

Section 4. Technical sciences in general

DOI:10.29013/EJTNS-26-3-33-38

FORMATION OF AN INNOVATIVE PERCEPTION OF THE ACADEMIC COURSE IN NATURAL SCIENCES. (Methodology for developing students' innovative perception of the academic course in natural sciences and the features of technologies for the mass production of ultra-pure food products)

Babadzhanian Heorhii [1]

[1] Specialist in Natural Food Technologies Los Angeles, CA

Cite: *Babadzhanian H. (2026). Formation of an innovative perception of the academic course in natural sciences. (Methodology for developing students' innovative perception of the academic course in natural sciences and the features of technologies for the mass production of ultra-pure food products). European Journal of Technical and Natural Sciences 2026, No 3*. https://doi.org/10.29013/EJTNS-26-3-33-38

Abstract

The article examines the methodology for developing students' innovative perception within academic courses in natural sciences under conditions of rapidly evolving technological and educational environments. Particular attention is given to the increasing complexity of higher professional education resulting from the widespread implementation of artificial intelligence technologies and the growing demand for multidisciplinary specialists in innovative industries and startups.

The article emphasizes the importance of integrating innovation-oriented approaches into educational practice, including the use of the Theory of Inventive Problem Solving (TRIZ) and the Algorithm for Inventive Problem Solving (ARIZ). The proposed methodology is illustrated through the example of nano-emulsion technology development, demonstrating how systematic analysis, patent research, and the identification of paradoxical elements can contribute to the creation of innovative technical solutions and the development of students' innovative thinking.

Keywords: *Academic course; Innovations; Innovative perception; Innovative perception of an academic course; Academic course in natural sciences; Mass production technologies; Startups with the development of integrated technologies and approaches in automated food and confectionery mass production systems, taking into account the need for effective interaction in the fields of integrated technological and physiological relaxation and rehabilitation; Multidisciplinary specialists capable of developing new processes and equipment in the dynamic environment of startups or in the innovation divisions of established companies*

Higher professional education pedagogy for training startup personnel involved in the development of integrated technologies and frameworks within automated food and confectionery mass production systems, taking into account the need for effective interaction in the fields of integrated technological and physiological relaxation and rehabilitation, has currently become significantly more complex due to the widespread implementation of elements of artificial intelligence and artificial neural networks.

The methodology for developing students' innovative perception of an academic course in natural sciences should include these innovative elements and approaches.

At present, it no longer surprises anyone that the economies of developed countries have become and continue to become innovation-driven.

Science, industry, agriculture, medicine, and digital technologies require interdisciplinary specialists capable of developing new processes and equipment in the dynamic environment of startups or within the innovation divisions of established companies.

Classical educational materials, as a rule, do not contain an innovation-oriented component within the educational content, and therefore young professionals, in order to compete successfully in the innovative and high-technology labor market, are forced to prepare independently and study new technologies from the perspective of their innovative application.

Naturally, the specifics of applying methods and techniques for optimization and modification of existing technologies for their use within a comprehensive innovation process may differ significantly for each industry; however, in educational institutions it is important to convey to students, first of all, the fundamental principles of such optimization and modification.

Based on the author's experience in teaching several technological courses related to restoration processes, it can be confidently concluded that there is a reliable tool capable of transforming a routine volume of educational material into an extremely engaging set of technical and technological methods for students, allowing them, as they say, to immediately become involved in the innovation process under current economic conditions and under the growing influence of global innovation trends and market requirements.

The author of this publication, Heorhii Babadzhanian, believes that such a sufficiently unique tool capable of meeting all the above-mentioned goals and conditions may be the Theory of Inventive Problem Solving (TRIZ) and the Algorithm for Inventive Problem Solving (ARIZ), developed in the last century by Professor Genrich Altshuller.

Considering all the profound and fundamental changes in technologies and materials, as well as the emergence of design software such as SolidWorks, which has radically transformed development and computer modeling processes, the methods and techniques for achieving the ideal final result, combined with the latest software products, should become such a unique instrument.

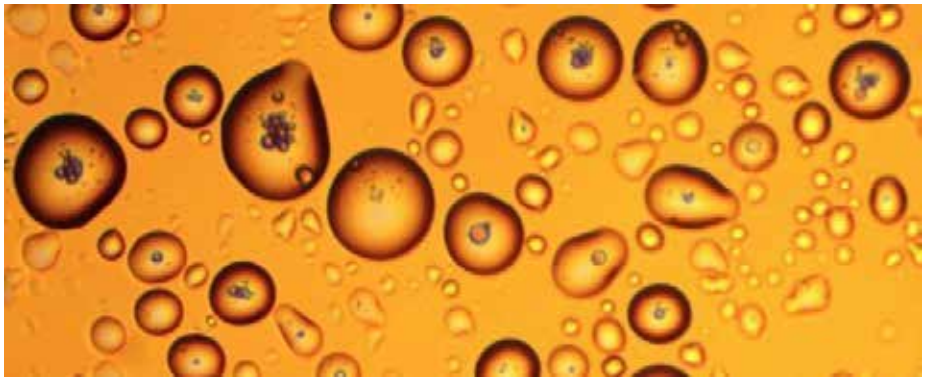
It is worthwhile to once again consider the presentation of the 40 methods and techniques for achieving the ideal final result, as well as their further development with adaptation to modern conditions of innovative production.

To begin with, let us once again examine the definition of the essence of the ideal final result adapted to completely new conditions and circumstances that have emerged recently.

According to specialists involved in developing specific demanded technical and technological solutions, the most important factor today is the previously anticipated paradoxical nature of the innovation solution itself and the paradoxical nature of the results obtained from applying this technical and technological solution.

As an example, the author of this publication, acting as a multidisciplinary specialist and restorer, proposes considering a new innovative technique for emulsion preparation optimized in all technological aspects, including the use of the latest source materials and the most effective technological methods, resulting in the emergence of nano-emulsions that fundamentally change the properties of emulsions and the conditions of their application.

Figure 1. *A photograph of an unusual emulsion obtained using a microscope capable of imaging and measuring objects within the nanometer range*



The author proposes returning later to the description of the features and properties of this new nanomaterial and, for now, considering the fundamental explanatory principles using the specified emulsion as an example, as well as new teaching methodologies and approaches for the integrated design of all nano-emulsion production processes and the processes and equipment used for preparing the initial components of this emulsion.

To begin the process of innovative design and to identify paradoxical elements within it and within the final product aimed at improving efficiency in all aspects, the author traditionally applies exploratory structural analysis.

At present, there exists a sufficient number of previous developments and patent materials in which certain aspects of the new development have been addressed to one degree or another.

Therefore, the first stage of structural analysis involves searching for analogous technical solutions in various fields of engineering and technology. Let us assume that the discussion concerns a fuel emulsion consisting of two main components: diesel fuel and water.

Since one of the emulsion components is water, the search keywords should be associated with water and various related processing technologies.

To make the search more specific, classical requirements for water used in emulsions are necessary.

Thus, water in the emulsion should not contain impurities or any chemical substances and reagents.

The second necessary characteristic is that the water in the emulsion should possess a specific level of acidity or alkalinity, and this, from the perspective of paradoxicality, should be achieved without the use of chemical reagents.

The water should possess a specific level of mineralization, which in turn determines its conductivity level.

Water should be introduced into the diesel fuel mixture under conditions of local cavitation and the formation of cavitation ruptures within the diesel fuel flow, and, from the perspective of paradoxicality, the formation of cavitation zones and the initiation of cavitation ruptures within them should occur without additional energy expenditure.

The turbulence level within the region of developed local cavitation should be uniform both at the center and at the periphery of the flow, and, from the perspective of paradoxicality, this should be achieved simultaneously with the formation of cavitation zones.

Ultimately, for patent research, the first stage involves selecting keywords from classical definitions of emulsions, while the second stage refines the search according to characteristics forming paradoxical elements within the technical properties of the emulsion and its production process.

Several United States patents are presented as search results.

These include a patent for a technique and technology involving reagent-free dynamic modification of acidity and alkalinity levels in a dynamic liquid flow, including water, as well as an innovative patent, exceptionally paradoxical for the process of cavitation zone formation within the emulsification section, related to a pneumatic vacuum gripping device.

Source 2 presents a United States patent for a pneumatic pseudo-vacuum gripping device which, paradoxically, develops a traction force at least ten times greater than that of a conventional vacuum gripper while consuming the same amount of energy.

Thus, in order to achieve a paradoxical result in the formation of a controlled cavitation zone at the location of intensive emulsification and to ensure a uniform turbulence background at every point of the cross-sectional area of this zone, it is necessary to incorporate into the emulsification apparatus a transformation mechanism for hydrodynamic system elements and parameters constructed according to the characteristics and principles of pneumatic gripping technology.

Of course, the fundamental design features and principles of the apparatus for dynamic emulsion preparation will require modifications; however, one of the paradoxical aspects of this apparatus modification lies precisely in the possibility of adapting the system of structural and technological characteristics of this patent to the structural and technological characteristics of an apparatus designed for dynamic emulsion preparation.

As a result, the invention described in the specified patent was adapted for an emulsion-forming apparatus, and the resulting emulsion demonstrated unusual, paradoxical results both in its use as fuel in a diesel engine and in properties never previously observed in such emulsions.

Source 3 presents a United States patent for a technique and technology for adjusting the acidity or alkalinity of a liquid within its directed flow, that is, within a developed dynamic mode, without using any chemical reagents.

The paradoxical feature of this apparatus and its technological implementation was the ability to generate both alkaline and acidic reactions within the same flow, followed by separation of these parts of the flow.

This property proved to be extremely valuable and led to the development of several new electrochemical equipment systems.

Thus, analysis, identification of keywords, and systematic patent research led to the creation of an innovative structure for preparing the components of a future fuel emulsion with paradoxical properties and capabilities, requiring practically equal expenditures of energy and other resources but possessing entirely new properties that ultimately resulted in the development of a nano-emulsion with fundamentally new characteristics.

The initial analysis and selective choice of devices and technologies for solving the problem of fuel emulsion preparation, taken as an example, made it possible to formulate technical requirements and, to some extent, technical specifications and characteristics for a new material which, as will become apparent from the following discussion, may be classified as a composite nanomaterial.

All preliminary analytical and research activities made it possible to formulate additional paradoxical properties of the new composite material.

First of all, an answer was found to an important fundamental question regarding how long the emulsion can retain its properties and characteristics.

In conventional emulsions, these properties are determined by the quantity and concentration of chemical stabilizers and preservatives.

For fuel emulsions, every additional chemical element increases the level of exhaust gas pollution, which in principle makes its use impossible due to increasingly stringent environmental standards and strict requirements imposed by manufacturers of thermodynamic equipment and diesel engines.

To enable integration of the emulsification system into the fuel supply lines of thermodynamic equipment, at least one requirement must be satisfied: the dynamic production process of the emulsion must not exceed one second in duration.

Since today mechanical mixing of emulsion components requires dozens of times more time, this factor may be regarded as a paradoxical element, without achieving which the issue of replacing diesel fuel with an emulsion cannot be resolved.

This factor forms the basis for the keyword system used during the subsequent stage of patent research.

At this stage, a patent was identified (Source 4) that establishes the novelty of technical solutions for adapting the preliminary properties of emulsion components within an apparatus and a method for producing nano-emulsions in a flow process,

imparting characteristics and properties to the resulting emulsion that create a paradoxical effect compared with classical emulsion production technologies, expressed in the following characteristics.

- the emulsion contains no additional chemical additives.
- the water used for the emulsion contains no chemical additives.
- ordinary tap water with reagent-free adjustment of acidity or alkalinity may be used for the emulsion.
- the emulsion may represent a compressible liquid.
- the emulsion may be stored for an unlimited period of time and re-emulsified prior to use.

The last paradoxical property of the emulsion requires a detailed explanation.

Figure 2. *Internal structure of an emulsion based on heavy diesel fuel*

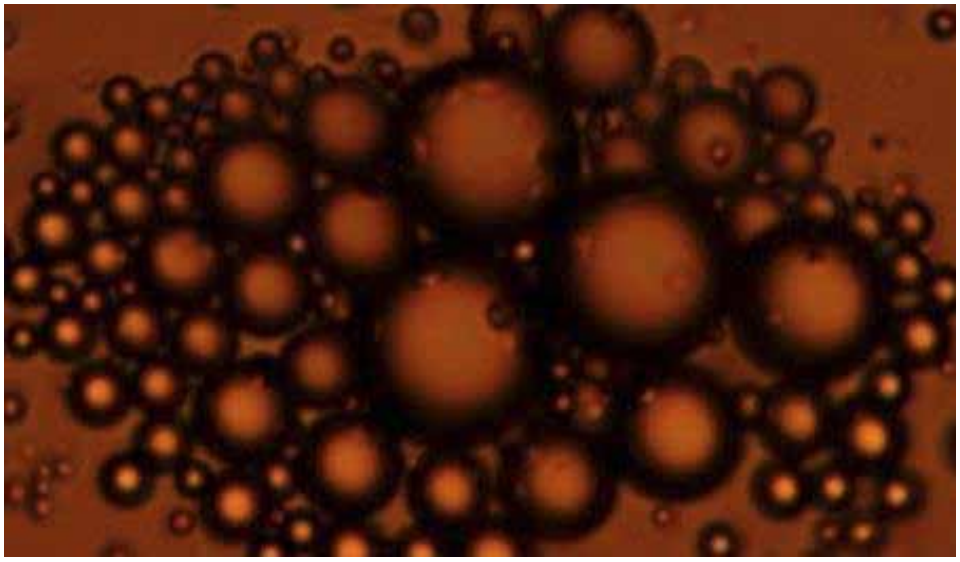
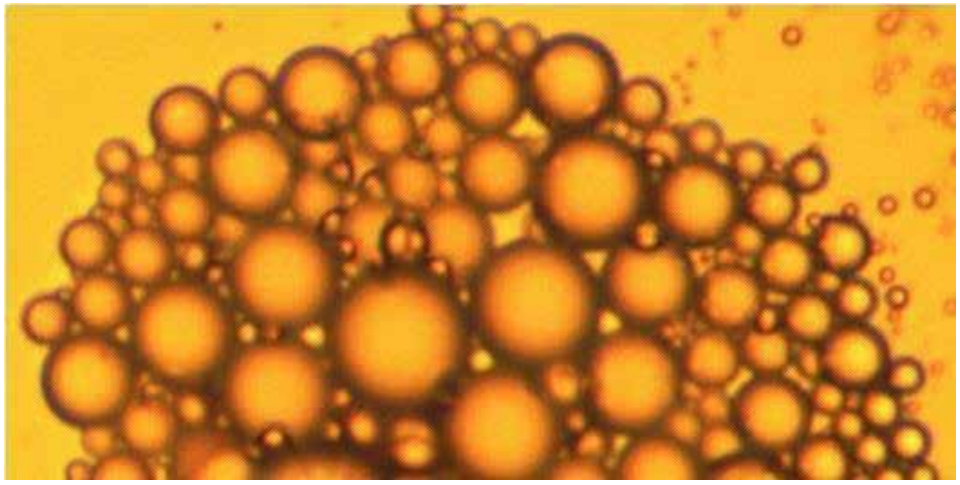


Figure 3. *Internal structure of an emulsion based on light diesel fuel*

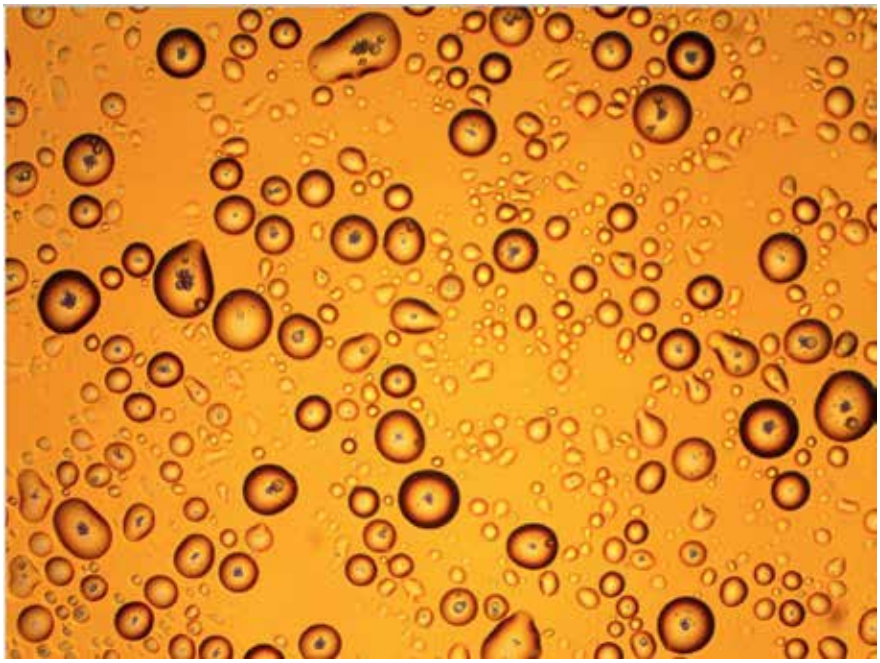


As can be seen from the photographs (taken at the same scale factor), the sizes of the emulsion capsules are practically identical for both heavy diesel fuel and light diesel fuel and range from 3–5 microns along the outer shell.

Thus, during long-term storage, the nano-capsules are preserved and, prior to use, if the emulsion is re-emulsified, they form the shells of macro-capsules, which makes it possible to restore the original internal structure of the emulsion almost instantly.

Numerous tests of this technology confirmed the accuracy of the preliminary calculations.

Figure 4. *Structure of the emulsion showing that capsules with an outer diameter of 3–5 microns contain nano-capsules, each measuring 100–250 nanometers*



All of the above demonstrates that the proposed method of innovative design and system analysis using the principle of identifying paradoxical elements within initial technical characteristics and technical specifications makes it possible, through the use of standard methods of patent research, analysis, and selective selection of operating characteristics, to achieve the required parameters and results of the designed or developed process or apparatus.

References:

Altshuller, G. S. *Theory of Inventive Problem Solving (TRIZ): Theory and Methods for Solving Inventive Problems*. A field of knowledge concerning the mechanisms of technical system development and methods for solving inventive problems.

United States Patent No. 5,871,814. *Pneumatic Grip*. Issued February 16, 1999.

United States Patent No. 6,139,714. *Method and Apparatus for Adjusting the pH of a Liquid*. Issued October 31, 2000.

United States Patent No. 9,310,076. *Emulsion, Apparatus, System and Method for Dynamic Preparation*. Issued April 12, 2016.

submitted 13.05.2026;
accepted for publication 27.05.2026;
published 31.05.2026

Contact: babadzhanian.g@gmail.com