The Chemistry of Friccohesity for Industrial Nanoformulations

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Cambridge
Scholars
Publishing

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This book first published 2023

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (10): 1-5275-9363-0
ISBN (13): 978-1-5275-9363-3

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BRIEF INTRODUCTION TO THE BOOK

Friccohesity concerns a mutually operational interface for chemical thermodynamics and quantum mechanics. The spins of a single electron allow the quantum energy barrier to be crossed with heat energy or chemical energy released during the making or breaking of bonds, inducing kinetic oscillations in the electron and developing wavefunctions (ψ) in the time domain in seconds (s) per centimetre (cm) in the space domain. The chemistry of friccohesity presents a foundational breakthrough in the area of advanced molecular interaction engineering for high quality product formulations. Friccohesity offers an advanced perspective and pushes the frontiers of the physicochemical data sciences by generating intrinsically intimate electronic wavefunctions of the interacting atoms in the formulation of chemical species. These electrostatically coordinated molecular properties can help in the development of new applications in the physicochemical sciences via quantum chemistry, driven by potential and kinetic energy at the scale of the Schrodinger equation and providing the genesis of the concept of friccohesity. Understanding the chemistry of friccohesity will enable researchers, academicians, and industries to solve several problems related to particular formulations, which face barriers in the formulational phase due to the insolubility of molecules in solvents. In designing chemical formulations, friccohesity defines the frictional forces and the cohesive forces of the interacting molecules with the selected solvent systems during homogenization to develop quality products with particular thermodynamic and kinetic stabilities. No chemical process occurs without the mutual exchange of the frictional and cohesive forces of the chemical substances in the liquid mixture used. The product of these forces is referred as friccohesity, which is a constant value under the prescribed experimental conditions of temperature, pressure, pH, and composition. Basically, friccohesity represents the spontaneity of a system and is at the core of molecular interaction engineering for better nanoformulations. Despite being a central part of developing better and more stable liquid formulations, no specific focus has been placed or detailed study made of the chemistry of friccohesity. The simplest example of this process is the mixing and homogenization of water and oil using surfactants (cationic, anionic, and nonionic) despite them being immiscible. Without using a surfactant, their respective cohesive forces remain unused as no mixing or homogenization occurs. The dipoles or charged sites of the water are unable to interact with the strongly hydrophobic elements of the oil. The hydrophilic head and hydrophobic tail or alkyl chain of the surfactant interacts with the water and oil, transforming the cohesive forces or potential energy into oscillatory motions that have kinetic energy. Currently, friccohesity is becoming an essential supporting chemical science for developing formulations of nanoemulsions by adding multiple ingredients of different natures and structures. Friccohesity offers a workable interfacial chemical activity of approaches and processes that can assist in obtaining final products with particular physicochemical properties. It also advances and supplements new trends in the practice of chemical formulation, especially for the pharmaceutical and petroleum industries. The chemistry of friccohesity offers a foundation for many other chemistries, such as green chemistry, in the development of product formulations through covalent bond formation or making use of secondary bonds like electrostatic and hydrogen bonds. The chemistry of friccohesity explores the wavefunctions necessary for reacting or interacting chemical species to overcome the quantum energy barrier resulting in greater yields without forming polluting side or byproducts. The chemistry of friccohesity lays a foundation for novel interfacial interacting engineering by choosing efficient chemical species that can transform the *cohad* (**coh**esive and **ad**hesive forces or potentials) of chemical formulations. The chemistry of friccohesity allows us to explore the most intimate wavefunctions at the mutual interface of thermodynamics and quantum mechanics in relation to cohesive forces or potential energy and adhesive/frictional forces or kinetic energy. The book presents an extraordinary number of interfacial demonstrations, expressions, and applications of capillary action and its science. The chemistry of friccohesity explains the new fundamentals and milestones of capillary science in the analysis and interpretation of relevant experimental data. These interfaces gather, compile, and integrate the multiplex of capillary activities concerning friccofluidics in the various disciplines of biological, biochemical, biophysical, bioengineering, and industrial chemistries to strengthen the resilience of the interfacial physicochemical sciences. The contents and interpretations presented in this book promote expertise in the areas of capillary action, friccohesive chemistry, and associated interdisciplinary areas. As such, this book introduces a new and novel chemistry—friccohesive chemistry—which can be applied universally in each and every discipline of science and technology to formulate second generation, smart, and multifunctional materials. Such applications include products and procedures relating to: nanoemulsions; micelles; liquid crystals; nucleated crystal lattices; the doping of well-defined substances; capping; encapsulation; coagulation; precipitation; coalescence, nanoclustering; and drug pharmacodynamics and pharmacokinetics. The electron driven activities and orientations of solute and solvent interaction engineering are commonly applied where chemical substances undergo monodispersion by the transformation of their cohesive forces into adhesive forces. The cohad forces are at the heart of generating interactions that homogenize mixtures on the thermodynamic and kinetic scales. The formulation of a homogenized nanoemulsion can result in various physicochemical actions and properties, such as: light reflection; heat dissipation; adhesion; sensing; and catalysis. A balanced cohad state can lead to the development of a larger surface area, surface charges, and zetapotentials, which modify the chemical processes and generate new and novel forms of friccohesive chemistry. Cohad engineering results in new states of chemical substances with novel physicochemical actions and properties. Friccohesity itself is a product of the cohesive and frictional forces obtained through oscillatory motions like the wavefunctions of interaction sites that overcome the quantum energy barrier. The adhesive forces develop frictional forces or shear stresses with liquid samples, overcoming the quantum energy barrier when they are permitted to flow within fixed boundaries. Thereby, friccohesity generates valuable interfacial phenomena and states and the intimate interfaces of the substances involved lay the foundation of friccohesive chemistry. Friccohesive chemistry concerns chemical constituents and their electronic configurations, which can catalyse molecules so that they participate in product formulation. Atoms with specific electronic configurations in relation to their protons are able to induce electronic phenomena like wavefunctions and the quantum tunnelling resulting in interactions even in liquid states. These actions induce molecular motions because the electron of a specific atom of an interacting molecule causes an imbalance in the electronic energy and orients the molecules towards specific surfaces and directions. As such, the concepts of interconnectivity and shear stress come into the picture and result in a situation where excess molecules become oriented in such a way that it leads to the utilization of their charges, establishing connections between them. These links lead to adhesive geometries in spaces tuned by the fluid dynamics and the shape of the cohesive expression in the controlled pressure unit (CPU) of an instrument known as a survismeter. These links provide a resource for sensing molecular activity in a specified process, as they undergo structural transitions due to the activation energy and the actions of the solute and solvent. As such, friccohesive chemistry reveals the most delicate and complicated electronic wavevectors of molecules in terms of their oscillations and wavefunctions around a fixed lattice structure. Quantum mechanics can help us establish the transfer of oscillatory energy from one atom to another in another molecule through the action of quantum tunnelling. The study of friccohesive chemistry fundamentally captures these novel and hidden domains of interacting chemical species in a medium at a specific dipolar moment. A single molecule with a larger surface area and surface charges can generate suitable oscillations and wavefunctions, catalysing a chemical process without adding any catalysts or chemicals, or developing any other activities except the desired one in the so-called molecular economy. This book will be useful for understanding the interfacial interactions and the science of integrated chips, semiconductors, heat dissipation, light and electrically conducting materials, homogenized liquid formulations, ionic liquids, dendrimers, and liquid crystals. The book explores the potential for the oscillatory electrons of interacting atoms in participating molecules to establish functional interfaces with specific energy gradients due to the difference in the electronic configurations of adjoining molecules. Friccohesive chemistry can be used to explore the true potential of the interfacial interaction in a chemical reaction through a thermodynamic operator, as seen in entropy and tentropy. The book explores the rhythm and potential, spontaneous creativity, and science of a single molecule. Over the course of my teaching and research career, through theoretical and experimental analysis, I have found what may be described as a whole planet's worth of science on the surface of a single molecule. The friccohesity of the element Fe^{2+} can be used to elaborate the core science of deposition, encapsulation, and wetting with respect to two distinct surfaces with different potential engineering. Fe^{2+}, with comparatively low oxidation potential, undergoes oxidation as $Fe^{2+} \rightarrow Fe^{3+} + 1e$ with a unique friccohesive chemistry that allows it to overcome the quantum energy barrier and receive an electron in the process. We find a natural flow of energy via electrons in an interfacial joint venture with minimum entropy. The chemical thermodynamics of the reacting species induce entropic charges, enthalpic regulators, and collision orientations. These activities lead to the adherence of a specific molecule to a core molecule with a minimum quantum energy barrier. The friccohesity operator for the alignment of charges of the ions, molecules, transitional states, quasi-transition states, and irreversible states elucidate their mechanism. Friccohesive chemistry explores the hidden interfaces of molecular formulations obtained by applying the engineering of a molecular interaction driving substantial activity on a time-dependent scale. An example from the real world concerns water molecules adhering to nanoparticles (NP) of soil so that they can be transferred to root membranes to sustain crop plants. The potential gradients become a source for the exchange of water from the soil to the roots. The chemical contents of the root hairs, having limited water molecules, act as a compartment that can hold a concentrated solution, whereas the water molecules adhering to the soil particles act as a compartment for dilute solutions with comparatively weak adhesive forces and weak immobilization. Hence, these water molecules come together with moderate cohesive forces and flow towards the roots. Thus, friccohesity is a key sensing parameter that can be used to depict the action of the cohesive and adhesive forces present. The water molecules that adhere to the soil water particles equilibrate the chemical potential in the root compartment. Mutual adherence is not possible until and unless cohesive forces are generated through intramolecular activities, such as a partially positive charge on the H atoms and a partially negative charge on the O atoms in the water. These charges cause dipolar interactions based on a semiconductor mechanism that achieves an extremely small bonding distance. These activities allow the H atoms of one water molecule and the O atom of another to interact, initiating the development of cohesive forces. These partially-charged atoms lie within a single molecule, but the electron occupies an uncertain position and displays oscillation, inducing translational motion via rotational, vibrational, and electronic motions with certain wavefunctions. These motions develop wavefunctions with the transformation of potential energy to kinetic energy. Once it becomes electron deficient, the dipolar water molecule and rich sites develop dipolar interactions. Until and unless the water dipole interactions are disrupted and the potential energy is transformed into kinetic energy, adherence occurs. This situation exactly situates the role of a solvent for activating reacting or interacting species. The strength of the cohesive force present and the adherence index are functional and deciding factors. Since these processes go hand in hand, similar to redox cycles or activities, their measurement results in a super-functional chemistry that supersedes the approaches of green chemistry among others. The index of cohesive and frictional forces represents the friccohesity, giving us the key to facilitate formulation, reaction, activation, orientation, motions of collision, and spatial geometrization. The sodium (*Na*) metal in kerosene displays Rayleigh scattering where no chemical activity occurs, while the *Na* in graphene oxide displays anti-Stokes scattering. The adherence of the atoms of molecules with different electronic configurations, symmetries, and charges occurs. These parameters make adherence a prominent process and result in a new geometrical identity, leading to the creation of a new chemistry with different rheology and nanoformulations. The adhered molecules induce new actions and require energy from the solvent, thus generating a new fluid chemical environment, which is subject to particular fluid dynamics and induces resistivity. This is because the solvent molecules are structurally reoriented and the adhered species acquire different dynamic and electronic wavefunctions. As such, these chemical activities generate restrictions, noted as resistivity or frictional forces, because the fluid is subjected to a uniform capillary flow. The reason for this is that the adherence is quantized by aligning the adhered molecular entity within the solvent/medium. This creates a shear rate with a particular orientation occurring over time and the laminar layer or virtual liquid layers developing due to the uniform capillary used with a constant temperature and zero mechanical fluctuations. These layers further act as opposing surfaces and the fluid dynamics along with required activation energy allow the surface area to adhere the molecules through encapsulation, capping, and doping activities. Friccohesive chemistry explores all these matrices to consolidate the physicochemical properties found in the data. Simultaneously, experiments measuring the cohesive forces and frictional forces can be conducted using the survismeter. Friccohesity and the survismeter are prominent inventions available for the exploration of the novel interfaces in the processes of formulation, separation, coagulation, coalescence, fluorescence, and photoluminescence. Friccohesive chemistry draws attention to and takes serious note of the activities of the relevant chemical processes for exploring the molecular economy through the applied interfacial chemistry of a single molecule to initiate quantization. As such, this book articulately discusses and interprets the everyday chemical sciences to introduce and summarize the new themes, concepts, and genesis or origin of the *cohad* and its fundamentals. The origin of friccohesity lies in the nucleation of the lattice cell by the generation of thermodynamic and kinetic stability through homogenization with larger surface area and surface charges, thus resulting in a novel interface for the applied chemical sciences. The surface area and surface charges lead to tentropy and other electronic surface activities.

1. THE CONCEPT AND DOMAIN OF THE BOOK

A large surface area and surface charges offer accessible surface energy to facilitate and reorient a molecule to initiate electronic, vibrational, oscillatory, and translational motions (EVOT). Such motions make a molecule accessible to interfacial or interlaminar interactions due to the extensive wavefunctions interconnecting the molecular ingredients. Hence, the orientation of the interlaminar layers with strong interactions at multiple interacting sites occurs, optimizing the structure. These interactions between molecules sitting in the spaces of interlaminar layers are reoriented to new spatial or geometrical coordinates of energy, shape, and motion. As cohesive forces, interlaminar forces with specific states of friccohesity define the interactional activities. The new geometrical energetic status participates in developing fluid dynamics with a new surface area, surface charges, and surface interactions, laying the foundation of friccohesive chemistry. Each constituent of a molecule in a nanoemulsion with available surface energy individually generates motions of different natures and energies in a single molecule, laying the foundation of tentropy. The survismeter senses the surface area, surface energy, cohesive forces, and surface charges in the ground state, which is not possible with usual or conventional methods. The survismeter can measure the surface tension and viscosity of a single component liquid like water, or a multicomponent liquid like a nanoemulsion, which have two distinct domains: "surface" and "bulk". Surface tension is a function of surface energy, surface area, surface charges, and surface topography, whereas viscosity is the outcome of the adherence of a solvent around nanoparticles and multiple ingredients. For example, mercury presents an extremely high level of cohesive forces and low surface energy with surface tension of almost 485.5 mN/m. Some nanoparticles that have been dissolved in the water molecules are reoriented, forming hydration spheres around cationic and anionic sites. This is noted as a secondary mechanism of nanoformulation leading to greater stability of the resultant liquid mixture. Liquid formulations make best use of a shift of the shared pair of electrons towards strongly electroactive atoms like the O atom in water, which develops a permanent dipole. Stable electrostatic dipoles form in a single water molecule. The dipoles develop potential energy or cohesive forces to keep similar molecules together and the distance between the interacting positive and negative dipoles or charge sites determines the strength of the cohesive forces. Nanoemulsions with multiple ingredients generate local velocity gradients that initiate adherence and the cohesive forces or potential energy of a solvent is partitioned to stabilize this adherence allowing the formulation of products with specific qualities. The quantitative analysis of the adhesive or frictional forces and cohesive forces engaged is made by measuring the pendant drop numbers and viscous flow times of a sample with the survismeter. The survismeter has an inbuilt mechanism allowing the determination of the integrated physicochemical profile through its respective capillaries and bulbs to facilitate the analysis of the potential energy or cohesive forces and the velocity gradients with respect to the adherence of solvent molecules around the solute or interacting species. A complete cycle of analysing a sample involves its uploading and release along a defined pathway to determine its viscous flow time and pendant drop number. In contrast, the spindle method, used to determine viscosity, only allows the estimation of the viscosity value and does not produce the ground-state data of shear stress and surface charges. The spindle disrupts the natural rheology of the sample, which is forced to rotate against its solid surface. Thus, the sample gains kinetic energy, which is left uncorrected. The survismeter tracks the original state of the shear stress in the ground state as there is a natural capillary to generate the velocity gradient, giving a real value for the shear stress from the dispersion of the medium. The size of the surface area drives surface activities by inducing the adhesion of solvents or other molecules, generating particular patterns of spatial geometry with specific orientations and quantized charges. These activities require large amounts of energy and a suitable time period for the application of the capillary and thus friccohesity gives a better picture of the activation energy and shear stress because the orienting structures induce adhesion of the molecules generating strong adhesive links. These charge site interlinkages are interaction sites of liquid mixtures in the ground state that generate shear stress. This phenomenon can be used to directly infer the structure that has emerged through the action of adhesion and its response when a resultant fluid is subjected to capillary flow. Had there been no adhesion, no shear stress would occur in relation to the solvent shear, taken as the reference or standard shear. Thus, shear stress and adhesion go hand in hand and adhesion is only possible when the solute disrupts the solvent structures and monomer structures surround the recipe molecules. There should also be sufficient surface energy for robust adhesion. Thus, friccohesity explores the domain of nanoemulsions and other industrial fluids, along with their formulation. The fundamental mechanisms of the formulating sciences determine how much adhesion occurs and how much shear is generated and the data can be used for safer drug dispersion in sciences like pharmacodynamics and pharmacokinetics. In this spirit, microfluidics derives from friccofluidics by equilibration of the cohesive and adhesive forces through a friccohesity operator. By using coloured $CoCl_2$, $CuSO_4$, $NiCl_2$, $Cr_2(SO_4)_3$, and $FeCl_3$ salts, with aqueous ethanol to tune the ionic hydration sphere (IHS), excellent friccofluidics can be developed, which can be used to support the transport of ions in roots, make conducting films, or check the activity of graphene oxide. Such friccofluidics can ensure the accurate flow of a high surface energy liquid through microcapillaries by maintaining adequate cohesive and adhesive or frictional forces under prescribed experimental conditions. As such, the ground-state mechanism of the fluid dynamics allows us to explore, extract, demonstrate, track, use, and apply friccohesive chemistry. Adhesion and cohesion are the foundation of the theories and building blocks of the formulation methodologies, allowing us to quantify and quantize the chosen molecules. It is problematic that one could study one part of a molecule and not gain a deeper and clearer picture of the overall integrated mechanisms at play. The process of reduction has no meaning until and unless it is accompanied by the process of oxidation and hence adhesion has no meaning until and unless cohesion is dealt with in relation to structural activities. In light of this, friccohesity can help to explain the processes of EVOT, including heat dissipation, charge conduction, and other transport properties. Friccohesity can explain the origin and conceptual transportation of a fluid having mutual distribution of cohesion and adhesion in terms of molecular energy. There has not yet been a breakthrough in tracking these powerful scientific processes, i.e. adhesion and cohesion together, and the survismeter has proven to be the greatest breakthrough in the integrated and wholistic study of biofluids etc. The survismeter can substantially assist in the design of aqueous nanoemulsions with ethanol, surfactant, ionic liquids, and graphene oxide (GO), coloured cation, and dendrimers. These nanoemulsions encapsulate the metallic oxide nanoparticles including magnetic nanoparticles like iron oxide (Fe_3O_4) and zinc oxide (ZnO), and nonmetallic nanoparticles like curcumin, proteins, and others. These formulations spread as a continuous thin film on filter paper, developing microcapillary arrays that allow the passage of solar radiation for photocatalysis. The ethanol, surfactant, and GO tune the friccohesity of the resultant liquid to enable the mixture to carry the desired ions for separation or sedimentation using a simple Whatman filter paper strip. The sodium (Na) metal, combined with water, displays Stokes scattering by generating a spark and heat from the splitting of the water molecule. The Stokes scattering shows that the resultant energy is limited because energy was used to drive the reaction. In contrast, the energy used in GO photocatalysis to reduce methylene blue (MB) dye acts as an anti-Stokes process with the dye reduced through the production of negative and positive holes within a similar structure. However, the Na metal in kerosene shows Rayleigh scattering and no energy of either is used. Thus, the friccohesity of Na metal with water increases because the cohesive forces of the metal atoms generate $NaOH$ molecules and H_2 gas. The friccohesity coefficient or operator is the most critical index when preparing nanoformulations for use in the development of nanothin films on specific substrates. Friccohesity basically concerns the state of liquid mixtures and the interactional abilities of individual chemical substances in a monosolvent such as water, dimethyl sulfoxide (DMSO), or acetonitrile, or in mixed solvents like buffers, cultures, and heat dissipating liquid mixtures. The activities and impact of any chemical substance can be determined by adding the same substance to mixed solvents or a monosolvent. Neither the viscosity nor the surface tension can be used to accurately determine the activities of a drug or nutrient, used as a dispersant in a specific medium, because viscosity only depicts frictional forces, while the surface tension deals with cohesive forces. Analysis of the functional interface that exists between these two operative forces has been lacking since the inception of the formulation sciences. The capability of dispersing agents to transform cohesive forces into frictional forces creates a real challenge to experimenters seeking to determine their kinetics and the appropriate experimental conditions. The kinetic-potential interface plays a critical role and can be explored by using a substance's friccohesity, as determined by the survismeter. The net state of cohesive or frictional forces can be determined by using a newly proposed equation based on the cohesive and oscillatory motions, i.e. kinetic energy, as

$$Friccohesity\ energy = \frac{p^2}{2m}(KE) - \frac{q^+ \times q^-}{4\pi\varepsilon_0 r^2}(PE)$$

where p^2 is the momentum; m is the mass of an electron; q^+ and q^- are the charges on the interacting sites of a molecule placed at distance er^r; and ε_0 is the permittivity of the medium. In a nutshell, the friccohesive energies, i.e. both the kinetic energy (KE) and the potential energy (PE), promote the homogenization and adherence of chemical species causing a monodispersive distribution of the chosen ingredients and the medium itself under the prescribed experimental conditions.

Friccohesity concerns a basic chemical activity displaying Raman scattering, which is the inelastic scattering of photons by matter or chemical substances. The matter or sample causes an exchange of energy and a change in the direction of light on receiving photons from a laser. As such, the surface area, which has surface charges that respond to photons, plays a critical role. Thus, friccohesity plays an important role and a sample that has high friccohesity can significantly scatter and change the direction of light in a visible manner. Greater friccohesity suggests greater surface area and surface charges in the sample. The available surface charges on the atoms of the molecules affect their interactions with photons that can induce specific patterns of light scattering. Before the application of the laser, the material will have high cohesivity and low friccohesity, but on receiving photons or phonons, the cohesivity is transformed into kinetic energy, which increases the friccohesity. Without the interaction of the laser light with the sample, the binding forces present act to keep similar molecules together, increasing the size and lowering the surface area and charges. The laser excites the electrons of the sample molecules so that they monodisperse on receiving phonons and the surface area increases. This results in higher friccohesity because different energy fragments are generated in the sample. The high energy molecules can shift into an adhesive mode by developing the adhesive forces through oscillatory motion. Furthermore, a sample that has high friccohesity can vibrantly respond to Raman spectroscopy. The frequency of the incident light will be greater than the light emitted through Stokes scattering, explaining the behaviour of the material. If an x-ray source is used, Raman spectroscopy allows the rotational energy (for a gaseous sample) and electronic energy levels to be analysed. Pulsed and multiple laser beams etc. can be used. The laser interacts with the material generating photons; if they are elastically scattered, then we see Rayleigh scattering. The scattered photons have the same frequency (ν)/wavelength $(E = h\nu$ where E is energy and h is the Planck constant) as the incident photons, but a different direction. If the material is strongly packed with greater size and smaller surface area, then the scattering effect is mild; if it has greater surface area and smaller size with higher friccohesity, then the scattering is highly and efficiently resolved. The intensity of the Rayleigh scattering ranges from 0.1 to 0.01 % of the incident laser source. Additionally, a smaller fraction of the scattered photons, i.e. ~1 in 10 million, may scatter inelastically, with the scattered photons having a different energy (lower) to those of the incident photons. These are Raman scattered photons and the material either gains or loses energy in the process. Rayleigh scattering was discovered in the 19th century and the Raman effect was discovered in 1928 (Adolf Smekal theoretically predicted this effect in 1923). The theory of friccohesity is directly connected to the surface area and surface charges illustrating the vibrant response of a laser with the electrons of a material. As such, if the material has dipoles that are highly engaged with the solvent or dopant, then dipolar stretching is inhibited due to the stronger shear stress developing higher polarizability. Thus, materials with high friccohesity are Raman active because the dipoles do not stretch with the same speed compared to the stretching of the laser dipole with electromagnetic waves. As such, friccohesive chemistry is the chemistry of a single molecule with vibrant tentropy. The origin of the core concept of friccohesive chemistry has been to develop a molecular economy for harnessing and achieving the potential of a single molecule along the axes of 'top versus bottom' via 'cohesive versus adhesive', 'bulk vs. monodispersion', 'entropy vs. tentropy' through intramolecular multiple force theory (IMMFT) and the 'surface area vs. size' of the potential and kinetic energies. These aspects can assist us in formulating efficient and effective natural science and products. Friccohesive chemistry is a big boost for developing the osmotic sciences in the areas of living systems, bound water in soil, efficient osmosis for the intake of water from soil through root membranes, and the intake of nutrients from the extracellular fluid to the intracellular fluid. If there are a cluster of water molecules, they will face barriers to crossing through membranes because of the greater size, smaller surface area, and reduced surface activities. The tentropy of a molecule is utilized in developing a cluster of charges on its surface. In general, the monodispersion of water occurs around the nutrients of fruits, which can facilitate improved intake. Friccohesity is an intimate operator of potential energy, expressed as cohesive forces, and of adhesive energy, expressed as frictional forces. Friccohesity, as an interacting operator, can explain the potential interface of these two chemical energies for the formulation of products through the monodispersion of ingredients, making the best use of their surface areas, surface charges, and energies. This is expressed by

$$\sigma_{\Psi} = \frac{q^+q^-}{4\pi\varepsilon_0 r^2} \pm \frac{p^2}{2m} \quad (1)$$

where σ_ψ is the friccohesity of the nanoemulsion; q^+ and q^- are dipolar charges with the interacting species placed at distance r (nm) in medium permittivity ε_0; p is the momentum of an electron or atom with respect to the mass effect; m is the mass of the electron or atom; and σ_ψ is a functional electron of the atoms in the participating molecules. The state of the electrons in the atoms develops a charge deficient site noted q^+ and a charge rich site noted q^-. As such, the q^+ and q^- centres develop their own wavefunctions, or areas of influence, which chemically communicate and develop interactions through an oscillatory mechanism. Their vibrational energy is calculated as

$$E_\upsilon = \left(\upsilon + \frac{1}{2}\right)\frac{h}{2\pi}\sqrt{\frac{k}{\mu}} \quad (1.1)$$

where k is the spring constant; μ is the reduced mass of the atoms vibrating in respect to a central atom; and h is the Planck constant. The vibrational frequency is determined by

$$\varepsilon_0 = h\upsilon_0\left(\upsilon + \frac{1}{2}\right) \quad (1.2)$$

where υ_0 is the fundamental frequency and υ is the frequency generated during the interaction to carry put the chemical process. υ is the vibrational frequency of the oscillations of electrons, or the vibrations of the dipoles or other interacting species. These generate a potential energy state and kinetic energy, until the process reaches its end, and are expressed as

$$\frac{2m}{\hbar^2}(E - V)\psi = \frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2} \quad (1.3)$$

where E is the energy and V is the potential energy at the Cartesian coordinates x, y, z having wavefunction ψ. Equation 1.3 is rearranged as equation 1.4

$$(E-V)\psi = \frac{\hbar^2}{2m}\left(\frac{\partial^2\psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}\right) \quad (1.4)$$

where x is the location of an electron at time t within the atom. Eqn. 1.4 is rearranged as eqn. 1.5

$$(E-V)\psi = \frac{\hbar^2}{2m}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)\psi \quad (1.5)$$

and eqn. 1.3 is modified as eqn. 1.6

$$E\psi = V\psi + \frac{\hbar^2}{2m}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)\psi \quad (1.6)$$

Putting $\hbar = \frac{h}{2\pi}$ in eqn. 1.6, we have

$$E\psi = V\psi + \frac{h^2}{8m\pi^2}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)\psi \quad (1.6)$$

Potential energy is the electric potential energy and is caused due to the state and location of an electron with respect to the nuclei of a specific atom. It is noted as

$$V = -\frac{e^2}{4\pi\varepsilon_0 r^2} \quad (1.7)$$

However, at $r = \infty$, V = 0. Putting this value of V into eqn. 1.6, we obtain eqn. 1.8

$$E\psi = \frac{h^2}{8m\pi^2}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)\psi \quad (1.8)$$

Thus, the removal of electrons from a metal atom generates cations, resulting in the adhesion of more solvent molecules and developing ionic hydration sphere (IHS). The cations generate adhesion or shear stress. Equation 1.8 predicts that, with the adhesion of the medium with the recipe, the solute, and the NPs or the dopant with the substrate at the appropriate interacting distance, a higher level of friccohesity is obtained or generated. When an electron leaves an orbit such as $3s^1$ of *Na* metal, then V = 0, and so the equation for the Na^+ cation can be depicted using eqn. 1.8. The Laplacian operator (∇) is used to simplify this equation

$$E\psi = \frac{h^2}{8m\pi^2}\nabla^2\psi \quad (7a) \text{ and } \nabla^2 = \left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right) \quad (1.9)$$

If an electron in infinite potential exists on the x axis only, then eqn. 1 is solved as

$$\frac{2m}{\hbar^2}(E-V)\psi = -\frac{\partial^2\psi}{\partial x^2} \quad or \quad -\frac{\partial^2\psi}{\partial x^2}+\frac{2m}{\hbar^2}(E-V)\psi = 0 \quad (2.0)$$

However, the wavefunction (ψ_n) is expressed as

$$\psi_n(x) = \sqrt{\frac{2}{a}}\, sin\left(\frac{n\pi x}{a_0}\right) \quad (2.1)$$

Here, n is the principal quantum number, x is the x axis, and a_0 is the Bohr radii, which is expressed as

$$a_0 = \frac{\hbar}{\alpha mc} \quad (2.2)$$

Also, for the principal quantum number n, the largest angular momentum L, i.e. the radial wavefunction R_{nl}, is determined by

$$R_{n,n-1} \propto r^{n-1}e^{-\frac{zr}{n\alpha_0}} \quad (2.3)$$

Thus, eqn. 2.3 is elaborated and expressed as

$$R_{10} = r^{1-1} e^{-\frac{zr}{\alpha_0}} \quad \text{or } R_{10} = e^{-\frac{zr}{\alpha_0}} \quad (2.4)$$

The value of $R_{n,l}$ is calculated using the values of the principal quantum and eqn. 2.5

$$R_{n,l}(r) = \sqrt{\left(\frac{2Z}{na_0}\right)^3 \frac{(n-l-1)}{2n(n+l)}} e^{-\frac{Zr}{na_0}} \quad (2.5)$$

For the *H* atom, Z = 1 and He = 2. Putting Z = 1 for the *H* atom in eqn. 10a, we get

$$R_{n,l}(r) = \sqrt{\left(\frac{2}{na_0}\right)^3 \frac{(n-l-1)}{2n(n+l)}} e^{-\frac{r}{na_0}} \quad (2.6)$$

To give the value of $R_{n,l}(r)$ for $n = 1, l = n-1, l = 0$, eqn. 11 is

$$R_{10} = \sqrt{\left(\frac{2}{a_0}\right)^3 \frac{(1-0)}{2(1+0)}} e^{-\frac{r}{a_0}} \quad or \ R_{10} = \sqrt{\left(\frac{2}{a_0}\right)^3 \frac{(1-0)}{2(1+0)}} e^{-\frac{r}{a_0}} \quad (2.7)$$

Then, solving eqn. 2.7

$$R_{10} = \sqrt{\left(\frac{2}{a_0}\right)^3 \frac{1}{2}} e^{-\frac{r}{a_0}} \quad \text{or } R_{10} = \sqrt{\frac{2}{a_0} \times \frac{2}{a_0} \times \frac{2}{a_0} \times \frac{1}{2}} e^{-\frac{r}{a_0}} \quad (2.8)$$

the final equation is obtained as

$$R_{10} = 2\left(\frac{1}{a_0}\right)^{3/2} e^{-\frac{r}{a_0}} \quad \text{or } R_{10} = 2a_0^{-3/2} e^{-\frac{r}{a_0}} \quad (2.9)$$

The equation can be simplified for a better understanding of the quantum mechanics of friccohesive chemistry regarding the oscillation of an adhering molecule.

$$\mathrm{R}_{10} = \sqrt{\left(\frac{2}{\mathrm{a}_0}\right)^3 \frac{(1-0)}{2(1+0)}} \mathrm{e}^{-\frac{\mathrm{r}}{\mathrm{a}_0}} \quad \text{and} \quad e^{-\frac{r}{2a_0}} = \left(1 - \frac{r}{2a_0}\right) \quad (3.0)$$

Similarly, the radial wavefunction for the principal quantum number $n = 2$ and $l = 0$ of the interacting atoms can be calculated using eqn. 3.0. The quantum mechanics can be applied in relation to the angular momentum for an electron of an atom of two interacting molecules. The angular momentum of an electron defines the energy state occupied in the directions $x, y,$ and z to interact with the atoms of the interacting molecules. Electrons gain energy by the application of mixing, heating, stirring, and sonication to a molecule, as the geometrical arrays may not be quantized to induce the *cohad* ("coh" from cohesive and "ad" from adhesive forces) effect, which is the backbone of friccohesive chemistry. In its normal state, the electron is in the HOMO mode; it remains in a stationary state with a constant potential energy. On gaining energy, its wavefunction varies by the generation of oscillations in the waveform, with the definite wavefunction (ψ) and probability wavefunction (ψ^2), which are expressed as

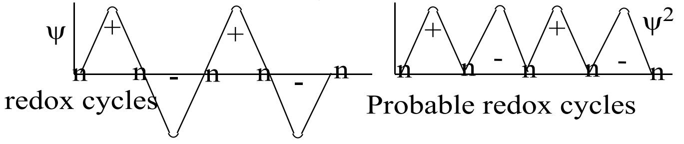


Fig. 1. Oscillations of the electrons within the atom generate ψ with a specific frequency depending on the state of the molecule containing the atoms.

The molecules in a liquid formulation are either heated or cooled and then the electrons of their atoms exponentially respond and generate ψ, which are functions of the wavelength and electronic configurations. An ideal gas like argon does not respond to heating, cooling, or its addition to water because its electrons are shared in pairs with the highest potential energy. In contrast, sodium metal responds quickly when added to water. The 3s^1 unshared single electron generates infinite frequencies with an exceptionally high energy attracting the $H^{\delta+}$pole of the water molecule and undergoing reduction to form H_2. The activities and wavelength of an electron of an atom in a molecule drive it to interact through electronic energy. This energy establishes contact between the similar or dissimilar atoms of the interacting molecules in formulations. The ψ, via energy distribution, finds its relevance in friccohesive chemistry by establishing contact and crossing over the quantum energy barrier.

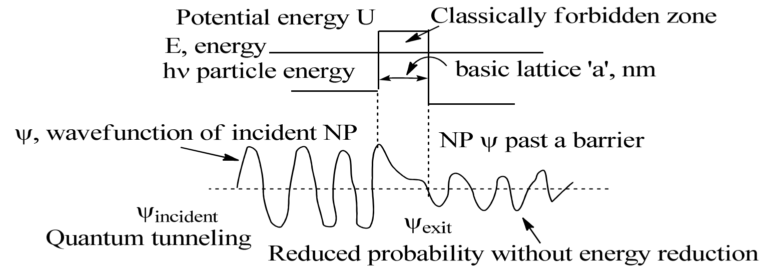


Fig. 1.1. The wavelength of an incoming photon or electron enables the ψ of an electron to approach near to the classically hidden area.

Friccohesive chemistry, then, basically explores self-catalysed chemical activities by achieving the adherence of chemical species after bringing them within a distance that allows contact between the oscillations of the electrons of the interacting atoms of the chemical substances resulting in the development of a stable product. The intimate contact of electronic oscillations sees the exchange of their cohesive or potential energy, dispersing and homogenizing a formulation. This is due to their opposite charges achieving adherence between respective chemical species. Friccohesive chemistry has the potential to facilitate the formulation of quality products, as a similar mechanism is already at work in the natural process. There is no match for friccohesive chemistry in any discipline because, in this approach, nothing extra is required to achieve chemically designed processes except to naturally and stoichiometrically engineer the cohad effect. Furthermore, friccohesive chemistry lays a foundation for interacting or reacting mechanisms by transforming the cohesive potential of a molecule and restricting its surface charges, thus giving it the capability to engineer the desired chemical mechanism. Friccohesive chemistry is a natural and green approach that allows us to explore potential combinations of chemical species. For example, engaging oil and water phases together does not allow us to achieve cohad activities until and unless the cohesive forces mutually interact. Surfactants that have hydrophilic and hydrophobic domains induce particular cohad thermodynamics with a single molecule on mixing in the water phase. No heating, no exceptional solvent, no sonication, and no catalyst is required to develop an oil and water nanoemulsion with surfactants. Thus, friccohesive chemistry supersedes the concept of green chemistry through the design of stoichiometrically new and high quality products with novel chemistry. The hydrophilic and hydrophobic domains of the surfactant overcome the energy barrier of the water and oil phases, inducing mutual solubilization. The classically hidden area or the potential energy is noted as a barrier, or barrier energy, that the incident electron ($h\nu$) must cross to interact with the electrons in another atom of another molecule at a distance that is close enough to initiate the desired reaction or interaction. For example, in the case of scanning tunnelling microscopy (STM), an electron of the silicon (Si) atoms of the cantilever, made of very pure Si, strikes the electrons of the atom of the sample. The barrier energy infers that the energy of the sample has its electron in equilibrium with the nuclear charge, which has the highest potential energy (U). Such a mechanism allows the adhesion of the interacting molecule to the core or the solute molecules causing a chemical process in an active mode by utilizing the cohesive energy of one molecule and transforming it into adhesive energy of a specific wavelength. Hence, this mechanism allows contact with the electrons of other atoms of a dissimilar molecule. The Schrodinger equation, which deals with the potential and kinetic energies of the electron of an atom, accurately reflects the origin of friccohesive chemistry over the Hamiltonian operator and contrary to the action of ideal gases like argon. The argon atom, with a fully shared electron system, has highly stable potential energy because none of its electrons can attain an additional wavelength, which could generate sufficient kinetic energy to cross over the energy barrier of the electron of an atom of a dissimilar molecule (Fig. 1.1). Thus, friccohesive chemistry originates from quantum mechanics where electronic energies are stimulated to generate a wavefunction ψ. The negatively charged electrons are bound by the positively charged nucleus of the atom. In the process of combining two different or similar atoms together to form a molecule, their valence electrons are shared with opposite spin. Since electrons are very lightweight, their charges become the determining factor of their overall behaviour. These electrons are easily excited from lower to higher orbital energies in a ψ form with the uncertain probability of finding these electrons in the space around the atom. As such, the overall behaviour of the electrons lays the foundation of friccohesive chemistry because similar molecules with similar atoms pave the way for the excitation of electrons resulting in sufficient excitation energy for the ψ. The energy of the ψ can be exchanged with molecules having similar or different atoms with different electronic numbers and ψs. This mechanism of sharing electrons in a molecule allows an interaction to occur that results in the formation of a specific spatial geometry with specific charge cages. Altogether, the cages develop different energy states and patterns of molecular motion using cohesive forces to initiate adhesive forces, which dislocate the molecule with varied energy utilizations. These electrons drive the spatial geometry of liquid mixtures and are helpful in developing industrial formulations with different properties, like light sensitivity, photocatalysis, heat sensitivity, redox sensitivity, wettability sensitivity, electrical conduction, heat-holding, and reflective activities. As such, these electronic formulations develop a particular molecular economy through the cohesive and adhesive operators of the friccohesity index of a specific liquid formulation. On gaining energy, an electron may escape its atom or go away from the nuclear charge (q^+) by increasing the distance r from the charge q^+, which decreases the cohesive or potential energy and increase the kinetic energy available for adhesive activity. The electron, which either escapes an atom or increases its ψ, intermixes with the energy of the electron of another molecule and facilitates adhesion or a doping-type mechanism in relation to the solute and solvent. These electronic activities are key points for the foundation of friccohesive chemistry, materialized through tentropy. The magnitude of the ψ matters a lot in inducing the activities of the interacting molecules and determining the overall action of the cohesive or adhesive forces of liquid formulations; these are the coordinates of friccohesive chemistry. Molecules with delocalized π electrons, or that have shifted a shared pair of electrons from one atom to another within a molecule, such as water, generate comparatively strong cohesive forces. The electronically-generated activities of the molecules in a fluid subject to capillary flow are consolidated into identifiable physicochemical properties. These properties can be made use of to probe and estimate the varieties of expression available and uncover the applications of fluids of specific structural substances. The fundamental purpose of formulating such fluids using the abovementioned chemical activities is to enable them either to encapsulate or moderately bind a valuable chemical substance and transport it from one location to another. The generation of such activities in fluids is possible if their friccohesity is enhanced and they have adequate surface area and surface charges, which assist in adhering foreign particles. This can be seen in the way that red blood cells (RBC) capture oxygen and transport it to all the tissues and cells of the body. Higher friccohesity results in a greater ability to hold a solute or other desired food item in biofluids, which carry them with a solvent through capillary flows. This mechanism proves that despite the opposing forces of the adjacent laminar layer in a functional fluid, the subsequent layer still holds the nanoparticles and carries them with the solvent. The activity necessary to carry forward the NPs along with the fluid, which is oriented and confined as a layer during capillary flow, is expressed by shear stress or viscousness. Higher shear stress is generated by the adhesion of medium or solvent molecules around foreign NPs in the continuity phase. The continuity phase of a solvent is also essential for reasons other than holding NPs and this is the reason that friccohesity determines their surface forces and area. It can further be elaborated that the solvent or medium, which is reoriented by the solute, or the NPs engineer the overall activities of the solute as well as the solvent itself in such formulations. These activities go hand in hand like redox activities in a continuity, which also dissipate localized energies and charges to stabilize liquid formulations, especially in the case of nanoemulsions. For example, the right ventricle of the heart pumps blood to the lungs oxygenating it after its inhalation and capture from air. It is then brought back to the heart by the pulmonary veins, entering the left atrium from where it flows into the left ventricle. The pulmonary system circulates deoxygenated blood from the right ventricle to the lungs so as to exhale CO_2 etc. It returns oxygenated blood to the left atrium and ventricle of the heart. The pulmonary circulation works through arteries and veins. The bronchial circulation is a separate system that supplies oxygenated blood to the tissues of the larger airways of the lungs. The mechanism of oxygen binding with blood and its speed are both connected to its friccohesive activities. The oxygenated blood flows in arteries from the aorta to each capillary, with friccohesity rather than just viscosity, and the blood also carries different kinds of food molecules of different sizes with different surface areas. These particles of different sizes and surface area each have their own cohesive forces, which entangle the solvent or serum in different ways. These are mutually oriented or streamlined in the capillaries to sustain the flow and carry oxygen or food particles. The fluid dynamics of blood are attained by localized cohesive forces, which mutualize and generate a shear stress with a certain shear rate. This scientific mechanism is completed by point-to-point coordination of the cohesive and adhesive forces and can profiled in terms of friccohesity. It is constituted by mutual exchanges of cohesive and adhesive forces. The adhesive forces are generated by the adherence of different molecules or solvent molecules with the solute or recipes causing shear stress. This is justified by the fact that molecules of the same size in a specific solvent or medium flow with different shear rates, as the activation of the nearby molecules require activation energy to streamline the fluid dynamics. Regarding the adhesive activities, the solvent can develop different spatial geometries around specific surface areas. The surface area of the dispersing molecules, like oxygen in blood or protein in a buffer solution, induces the dispersal activities of the medium for the solute or recipe molecules. As the molecules of a medium with strong cohesive forces have smaller surface energy, they do not disperse the solute molecules successfully. The molecules of the dispersing medium, with higher cohesive forces or higher surface tension, do not acquire sufficient activation energy to achieve dispersal by surrounding the solute molecules and forming something like a cage. Therefore, the dispersing molecules undergo disruption of their hydrogen or ionic bonding, providing sufficient energy to activate them. The cohesive energy, which was used to hold the molecules of the medium together, activate the recipe molecules for the initiation of chemical activities. The model of cohesive forces depicted in Fig. 1.2 is supported by particular ψs in a manner that explains the presence and structure of the constituents of the solute, as well as of the solvent. Each layer of the pendant drop, measured by a pendant drop number (pdn), depicts a wave-type propagation with a fixed phase gap (φ) in time t (sec.) when a Newtonian liquid is used; however, the phase gap changes if a non-Newtonian liquid is used for the measurements. Figure 1.2. illustrates pendant drop formation.

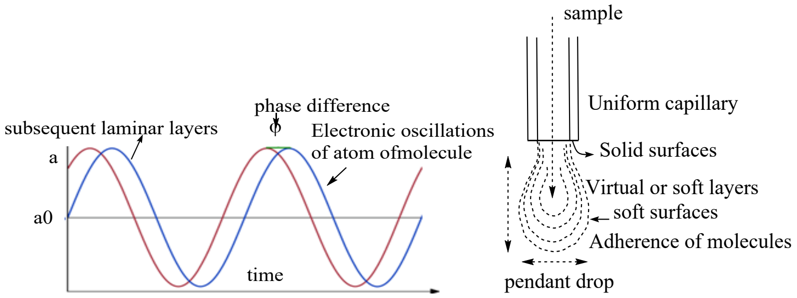


Fig. 1.2. Thin layer of a fluid sample forming an adhesive layer according to the cohesive forces of the molecules of the medium and generating a continuity in chemical activity, such as dipole/functional groups with opposite charges, developing a continuous thin layer with a specific surface area and surface charges.

The liquid sample forms a pendant drop as the adhesive and cohesive forces work together to form a layer in continuity and push the liquid sample forward. The adhesive forces work to keep the two or more virtual layers in intimate contact, increasing the size of the pendant drop. Initially, a few molecules of the water become activated, gaining energy that oscillates the electrons of their respective atoms. By this mechanism, the activated water molecules develop greater surface area and higher surface charges with higher kinetic energy. These properties generate a laminar flow and the microfluidics are expressed as friccofluidics with both cohesive and adhesive or frictional forces working in a supplementary fashion. The friccohesity can be directly measured and calculated by putting the pendant drop numbers and the viscous flow times in the equation without using the density data. Figure 1.2 depicts how the electrons of the atoms of a sample molecule reorient to generate a laminar layer according to their electronic energy, which is expressed as ψ, and other forms of motion, including translational and rotational. The adherence of the solvent around the recipe molecules also maintains a continuity in the opposite dipoles resulting in pendant drop formation despite an adjacent layer that resists moving along with it due to the surface charges. The flow of the liquid sample results in surface charges, which also attain equilibrium, and this is the reason that the buffer bulbs are used in the survismeter. As such, the surface, according to the surface area of the previous laminar layer, induce a gap exactly in the sample phase. Each adjacent layer is accommodated by the previous one in the same phase with a specific phase gap (φ) over time t. Thereby, we can explore the coordinates for modelling the fluid dynamics. This makes use of the friccohesity operator, aligning the cohesive and adhesive forces together to develop a pendant drop of a fluid in the non-fluctuating environment of the survismeter's pressure bulb. The adherence of varieties of dissimilar solvated molecules or ingredients around a core molecule creates unique friccohesive chemistry that forms a pendant drop in the medium of air. It does not create much resistance in adhering the solvated molecules with the virtual or soft surfaces of the adjacent layers. Fundamentally, this creates a novel expression of the surface area, surface charges, tentropy, and molecular motions, including translational and rotational motions. Initially, the liquid sample adheres to the solid surfaces of the surface tension measuring capillary (Fig. 1.2). The real spatial geometry of the adhering molecules on the surfaces of the laminar layers constructively influences the shape and dimensions of the pendant drop, which is intimately correlated or directly related to the structure of the molecules involved. Thus, friccohesity can help elucidate the most fundamental features of the adherence of a liquid sample on the solid surfaces of the capillary and, latterly, the formation of the laminar layer of the liquid sample. This allows the formation of subsequent laminar layers until the adhesive forces of the sample with the solid capillary surface become equal to its cohesive forces. Thus, the liquid, rather than becoming oriented to form the pendant drop, is subjected to flow within the capillary of the viscosity unit. This linearly forms laminar layers that can generate opposing or resistive force. These two chemical processes, along with the formation of soft laminar layers in air and in a liquid medium, lay the foundation of friccohesive chemistry. Today, science has had to develop conceptually to correlate the resistivity of the cohesive forces and adherence-driven laminar flows in two different modes in a buoyant environment in the controlled pressure unit of the survismeter. In this regard, exploring the patentability of the experimental observations is a revolutionary step on the timeline for growing or nurturing the ideas of rheology and friccohesive chemistry. For example, the idea of friccohesive chemistry has been nurtured in a mode of thought that is "outside the box" by exploring the working coordinates in a critically selective approach to better understand the functional molecular properties. There is a valid process in the creative domains for those who have a strong desire to think and create a non-obvious possibility for taking a patentable idea from the laboratory and develop it into a working application. Thus, an idea's patentability gives us a ray of hope that we can grow and harvest the fruits of new and state of the art science and technology. The designing of experiments for validation lies at the heart of an idea's patentability and transferability to commercial production. Therefore, these novel and extraordinary ideas present the infinite dimensions of science and technology, but specific expertise is needed to explore the particular dimensions of specific applications. For example, rheologists, experts in friccohesive chemistry, application scientists, biophysicists, pharmacists, and nutritionists will all find an opportunity for further applications in their areas by using the survismeter to analyse the friccohesity and stoichiometrics of chemical substances. Perfect friccohesity infers a mutual exchange of cohesive and adhesive forces with total utilization and with the cohesive and adhesive forces remaining in stable equilibrium. The utilization of cohesive and adhesive forces should occur until a state has been achieved in which no unused molecular charges are left, as these create spontaneity to act. Such a state enhances the stability of the resultant formulation or nanoemulsion. The survismeter can be used to determine the surface area, surface charges, activation energy, and shear stress, expressed in terms of tensiometry and viscometry. However, the conceptual development of friccohesity has reduced a large corpus of terms and concepts into a combined smart and efficient physicochemical property. The components of tensiometry and viscometry help lay the foundation of friccohesive chemistry, inferring the best quality control in terms of perfect utilization of the surface charges of a nanoemulsion's components. Friccohesity can boost the measurement and interpretation of the wettability and formulation of excellent cosmetic products, laundry products, thin films, plastics, and textile dyes, among others. As such, working at the cutting edge with the survismeter we can lay the foundation of the friccohesity operator to quantize formulations, exploring and measuring the cohesive and adhesive forces of a fluid sample in one go. Friccohesity has not yet been fully explored or conceptualized, but the invention of the survismeter has made a breakthrough, allowing us to work with a new quadripolar model for recycling a sample within a common 3D bulb. The concept of friccohesity allows us to quantitatively resolve issues surrounding the unfolding of proteins and the quasistatic state of biopolymers vis-à-vis their cohesive forces and the adherence of molecules of the medium around them in the same proportion. Understanding the science of friccohesive chemistry is useful when examining the dynamics of the folding and unfolding of biomolecules. Conducting such studies is now possible because the survismeter allows us to measure the surface properties and adherence of chemical species of the buffer to monomers used as the medium. These activities infer the interface of Newtonian and non-Newtonian fluids; the fluids involved could be termed "friccohesic" and "nonfriccohesic" fluids. The pressure control unit of the survismeter can accurately replicate naturally occurring friccohesity in an uninterrupted pressure environment. Friccohesity tends to be a 2D physicochemical property of a liquid formulation. However, the measurement of friccohesity requires the use of the z-dimension to generate a pendant drop by the overlapping of a sample through the cohad. The survismeter resolves the difficulties faced when measuring the surface tension, viscosity, and friccohesity of volatile and inflammable carcinogenic fluids. It is also useful in measuring highly sensitive fluids vis-à-vis redox (reduction and oxidation), photocatalytic (positive and negative holes), and surface adhering liquids. The novelty of survismeter science and technology is that none of the sample comes in contact with the open environment, absolutely preventing contamination. The survismeter is a novel and cutting-edge technology for measuring many aspects including the surface energy, surface charges, surface activities, interfacial tension, and shear stress of liquid formulations; the transporting ability of biofluids; and the fluidity of diamond cutting oils, among others.

Definition of friccohesity: The electrons of an atom of a molecule oscillate, developing a wavefunction (ψ). This generates sufficient energy to overcome the quantum energy barrier and drive the contact mechanism for molecular interaction. Friccohesive chemistry constructs a foundation for the "contact sciences", motivated by the oscillations of electrons in water and other polar liquids due to contact between the negative and positive poles of the molecules involved. In contrast, we have the example of argon, which is a gas that does not have dipolar centres due to its completely full electronic configuration. This can be noted as

$$18Ar = 1s^2 2s^2 2p^6 3s^2 3p^6$$

As such, argon does not have valence and conduction bands because all of its orbitals are filled. Thus, no HOMO to LUMO or electronic transition state occurs to maintain the equipartition of the electronic energy. The analysis of friccohesity, therefore, can directly reveal the mechanism of the relevant electronic activity. Friccohesive chemistry allows us to understand how stoichiometric mixtures of molecules establish binding through bond formation, hydrogen bonding, and ionic bonding as a fundamental law of the origin and development of tissues, hormones, and organs. The oscillations of electrons occur upon acquisition of sufficient activation energy and reorient the interacting sites for bond formation or for developing hydrogen bonds. Such oscillatory contact engineering generates a pattern of particulate aggregation, as in the case of carbon soot particles to which aggregated polluting gases adhere. It is a fact that a single atom or electron does not remain alone, but rather combines with other similar or dissimilar atoms through its ψ, transforming potential energy to kinetic or oscillatory energy. This can be termed "cohad transformation".

Determination of molecular weight: In chemical processes, adherence is one of the most critical criteria for determining the molecular weight of polymers, dendrimers, webdrimers, proteins, graphene oxide, and other macromolecules in suitable solvents at a specific pH and temperature. The solvent molecules adhere to the surfaces of the sample molecules covering the available surface area and using the surface charges of functional groups. These moieties have positive and negative holes or charged centres, which interact with the charged centres of the solvent or medium resulting in monodispersal of the macromolecules where the solvent has developed adhesion. Thus, the geometry of the macromolecule determines restriction in the capillary flow of the sample as the uniform inner surface area and dimension of the capillary streamlines the solvated complex or solvated nanocomposite. As a result, the shear stress is directly proportional to the size of the molecule. This is defined by the polymerization or folding of the macromolecules, with the encapsulation capacity of a supramolecule, like a webdrimer. As a result, the molecular weight is determined as being directly proportional to the shear stress; however, the surface area and surface charges cannot be found directly. Hence, friccohesive chemistry allows us to fill this gap by driving the adherence of a solvent. The friccohesity value can be used to determine the surface area and surface charges, which facilitate adherence, and without taking the surface related activities of the molecules into account, the determination of the molecular weight may not be accurate. The Mark-Houwink-Sakurada equation was formulated to determine the molecular weight

$$[\eta] = kM^a \quad (3.1)$$

where $[\eta]$ is the intrinsic viscosity in $(dL/mole)$; k is constant; and M is the molecular weight in g/mole. The constant 'a' is determined by the overall size, surface area, and geometry of the macromolecules studied, influencing the orientation of the solvent to facilitate adherence and alignment. Hence, friccohesity can be used to accurately determine properties or parameters that elucidate the state functions. Thus, replacement of the constant 'a' by the friccohesity value $(\sigma, s/cm)$ of the solvent can be used to accurately determine monodispersion, including the correct molecular weight

$$[\eta] = kM^{\sigma} \ (3.2)$$

The sole criterion for determining the molecular weight of a macromolecule using shear stress is the value of adherence when the solute and the solvent mutually respond, as their surfaces have interacting surface charges that result in a specific set of fluid dynamics through the creation of resistance against the structure of the solvent. If a macromolecule is insoluble in any solvent, then the friccohesity of these immiscible chemical moieties remain and no molecular weight can be determined. Markers having molecular weights that are almost in the same range as the sample are used to determine the constants k and a at the same temperature. Basically, friccohesity, unlike viscosity and surface tension, along with the adhesive and cohesive forces, can transform the cohesive force of one cm^3 to an adhesive or frictional force over a prediod of one second.

1.1. The Fundamentals of Friccohesive Chemistry

Two different atoms with different partial charges in similar molecules interact and develop cohesive forces, for example, an $H^{\delta+}$ atom of one H_2O molecule and an $O^{2\delta-}$ atom of another H_2O molecule interact and the chain of interactions continues among all the water molecules present in a sample of pure water. This mechanism of partially charged atoms (PCA) holds the water molecules together through hydrogen bonding and electrostatic forces. These forces are referred to as cohesive or structural forces. In the case of two different PCAs of different molecules, such as an $H^{\delta+}$ atom of an H_2O molecule and an $O^{2\delta-}$ atom of ethanol or another molecule, forces develop between different molecules, which are described as adhesive or formulating forces. The PCAs interact with oppositely charged energy vectors through a definite charge function noted as ψ (wavefunction), but a part of the molecule is different. Active molecules such as 3,3′,5,5′-tetramethylbenzidine (TMB) and trimesoyl tridimethyl malonate (TTDMM) dendrimers, can be used as nanostabilizers, as they have partitioning vibrancy with multiple ψs of specific energy. A nanostabilizer is a molecule that can stabilize the thermodynamic, kinetic, and tentropic characteristics of a nanoemulsion. TMB or TTDMM in a suitable hydrophobic medium can initiate the electronic activity of their atoms on gaining sufficent activation energy from the solvent molecules. The solvent undergoes structural changes to transform its cohesive forces in relation to the solute, dispersate, or adsorbate in a dispersion medium. This increases the surface area and surface charges, as shown below.

Fig. 1.3. The basic mechanism of friccohesity demonstrating the adhesive and cohesive forces generated by the electronic activity of the atoms of the interacting molecules.

We can see that the electrons of the participating atoms reach a ground state of zero energy to initiate the energy transformation using electron and proton attractions. This generates additional kinetic energy, which can assist in accommodating the kinetic energy through translational, rotational, vibrational, electronic, and HOMO (highly occupied molecular orbital) to LUMO (lowest unoccupied molecular orbital) activity, which is responsible for a multitude of applications such as the mutual adherence of the molecular ingredients. The wavefunction ψ with time ∂t can be usefully harnessed for the nanostabilization of a drug or other molecule in 3D geometry, expressed as

$$i\hbar\frac{\partial\psi}{\partial t} = -\frac{\hbar}{2m}\nabla^2\psi + V\psi \quad (3.3)$$

where V is the potential energy; ∇^2 is the Laplacian constant inferring the 3D cartesian coordinates (x, y, z); and $\hbar$ is the reduced Planck constant. The ψ in 1D is expressed as

$$i\hbar\frac{\partial\psi}{\partial t} = -\frac{\hbar}{2m}\frac{\partial^2}{\partial x^2}\psi + V(x,t)\psi \quad (3.4)$$

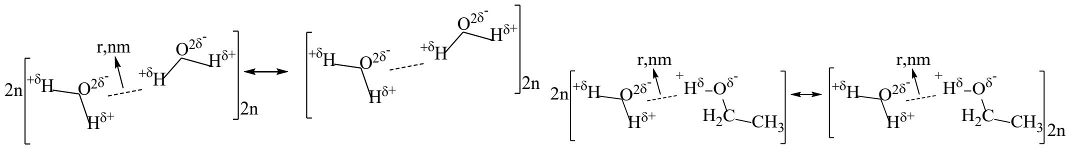
PCAs with their respective charges create their own charge effects and are expressed as charge oscillations, which result in the development of translational, rotational, and vibrational motions, and assist in encapsulation and steric motion.

$$\text{Electrostatic forces} = \frac{2H^{\delta+}O^{2\delta-}}{4\pi\varepsilon_0 r^2} \quad (3.5)$$

With the $H^{\delta+}$ and $O^{2\delta-}$ PCAs or nanoparticles in the manifold, the H_2O molecules interact and develop cohesive forces (CF)

$$n(\text{electrostatic forces}) \text{ or CF} = \left(\frac{1}{4\pi\varepsilon_0 r^2}\right)n\left(2H^{\delta+}O^{2\delta-}\right) \quad (3.6)$$

The PCAs of the water molecules hold them together and, similarly, the PCAs of water and ethanol mutually solubilize into a homogenous solution, as depicted below.



These motions are generated in the CPU of the survismeter because its spatial and geometrical dimensions have been designed to support molecular motion at the onset of capillary flow (1). The CPU acts as a bifurcating, equilibrating, and operational mechanism to support a liquid sample in forward and backward flow with the capacity to recycle a sample by moving it from the reservoir bulb (RB) to the functional capillaries of the survismeter. Vibrant and robust recycling frequencies of samples make the survismeter a novel analytical device for the exploration of the quantum mechanical tunnelling effects of sample and solvent molecules through friccohesity and tentropy. The wavefunction resulting from the electronic activity of the atoms of the solute allows the solute molecules to propagate with the wavefunctions of the electronic activity of the atoms in the solvent or medium. This is the reason that the solvent adheres around the solute molecule and carries it forward in the capillary. Water, however, cannot carry oil molecules through the capillary because there is no wavefunction tunnelling between them resulting in mutual adhesion. Friccohesive chemistry makes this possible because the atoms of the molecules of liquid samples are free to oscillate and translate through rotation, vibrate, and electronically activate molecules using potential energy (cohesive forces) and kinetic energy (adhesive forces). The adhesion of a solute molecule with the solvent seems to present an attractive model for liquid formulations, which can also describe the expression of cohesive and adhesive forces.

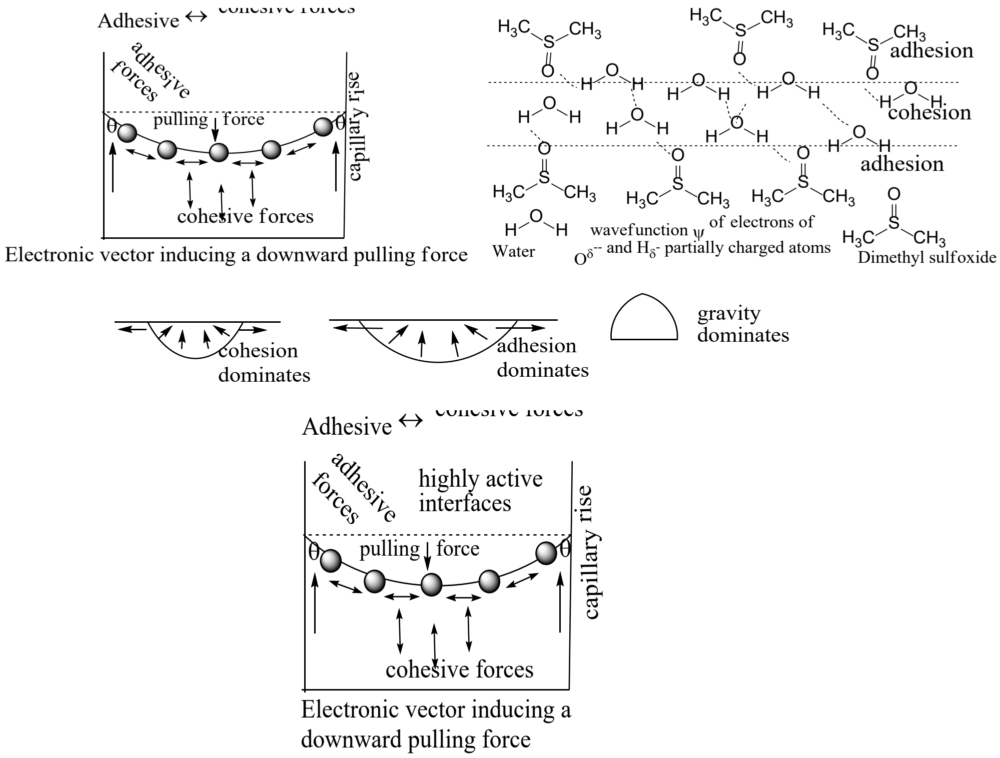


Fig. 1.4. Robust expression of friccohesity through cohesive and adhesive forces along a solid glass surface and the central part of the liquid.

The central part of the liquid experiences the adhesive force effect of the capillary wall. The adhesive forces of the wall and the downward pull of the central part of the liquid work in equal proportions. The stronger the adhesive forces, the stronger the downward pull. Thus, the value of contact angle theta (θ) is lower than 90°, depicted as $\theta < 90$. Stronger adhesion along the wall infers that the liquid sample strongly interacts with its surface forces. This generates the capillary action of the water, for example, so that it can enter the root hairs of a tree or plant in the ground. This process is also applicable to the operation of surfactants, biomacromolecules, ionic liquids, dendrimers, and graphene oxide, which have surface forces and water dipoles that respond and adhere leading to changes in the substrate properties. Cohesion results in a pointed or localized expression such as that found in a pendant drop, while adhesion leads a liquid sample to spread along solid surfaces, or even in the whole volume of a liquid sample filled in a vessel of specific dimensional geometry. The cohesive force operates most strongly at the central part of the drop and minimizes the surface area by increasing in size. With adhesion, the dimensional geometry is reversed. With reduced cohesive forces, it spreads across the surface. The coefficients of the operating forces can be interpreted using friccohesive chemistry, which is useful in chemical separation technology and chromatography. Friccohesive chemistry supersedes the approaches of quantum mechanics in designing a nanoemulsion medium for the monodispersion of the atoms of a molecule whose electrons develop sufficient area to oscillate and develop wavefunctions with definite wavevectors to cross the quantum energy barrier (QEB) of the electrons of another atom. If there are not wavefunctions for both the interacting and reacting electrons of the atoms of the molecules, there will be no translational motion to optimize the spins of the electrons of the adjoining atoms of the molecular species in the nanoemulsion. Adherence of the solvent to the solute in a binary liquid system or nanoemulsion, made up of molecular components or ingredients to counterbalance the hydrophilic and hydrophobic forces or activities through electrostatic and wavefunctions, is an essential structural reorientation. The actions of the solvent or other chemical species facilitate the appropriate distance between the interacting electrons of the respective atoms of the chosen molecules. Reducing the distance between the interacting electrons enables their oscillatory wavefunctions to overcome the quantum energy barrier. Here, the Fermi energy becomes a function that enables the valence band electrons to reach the conduction band electrons and overcome the quantum energy barrier. Conceptually, Fermi energy and friccohesity seem complementary to each other: both work when the electronic oscillations of the interacting molecules overcome the quantum energy barrier and establish spin contact for the optimization of the resultant state. Crossing over the quantum energy barrier generates a structure with higher immobilization of the resultant liquid mixture. The liquid experiences frictional forces in disrupting the immobilization to cross the Fermi energy barrier. As such, friccohesive chemistry can assist us in defining a molecular economy by tracking the spin of a single electron of a solvent or ingredient for mutual adhesion. These activities lead to the occupation of the valence band energy and to the conduction band energy, bringing the interacting species to the appropriate distance to develop thermodynamically and kinetically stable nanoformulations. Friccohesity deals with the optimal potential distributions of structures that can develop a potential or quantum well, or naturally occurring potentials and parabolic potentials occurring in nature like lattice vibration of periodic potential lattice atoms (Fig. 1.4.1).

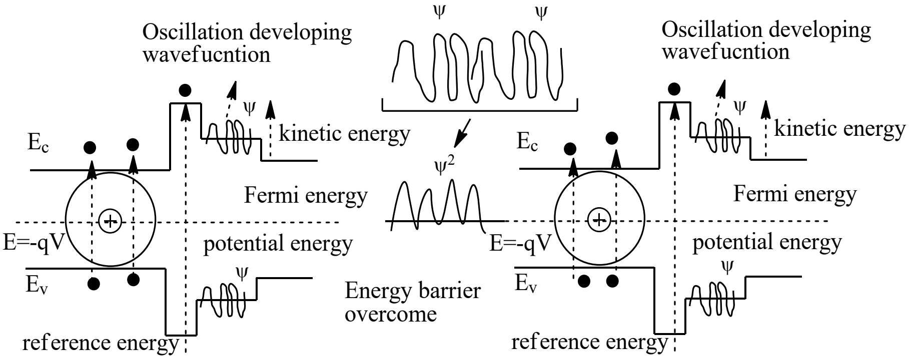


Fig. 1.4.1. Distributions of potential energy to ψs of interacting structures as a quantum well.

A friccohesive quantum mechanical model is generated by the adherence of a solvent to a solute through the partitioning of their structural potentials by their respective oscillating electrons and wavefunctions (ψ), which can cross the quantum energy barrier. The energy of the valence band electron (E_v) and conduction band (E_c) oscillate with Fermi energy where the resulting electrostatic charges (q) and electric potential (V) are coordinating, equilibrating the functions to facilitate electrostatic or electronically robust systems (Fig. 1.4.1). These coordinates work when the molecules are monodispersed, with sufficent surface area and surface charges, and where their electrons oscillate to develop robust adhesion resulting in the immobilization of the generated structures and developing higher shear stress. A monodispersion is possible when the cohesive forces or the potential energy are transformed into oscillating or kinetic energy, establishing proper adhesion with mutual hybridization and hence friccohesive chemistry presents the foundation of quantum mechanical processes for nanoemulsion formulation.

1.2. The Friccohesive Chemistry of Graphene

In friccohesity, the mutual dynamics of the cohesive and adhesive forces control the overall size and surface areas of the resultant formulations through their cohesive or structural and adhesive or formulating forces. The sigma $(\sigma)$and pi (π) bonds of chemical species like graphene and graphene oxide control the overall electronic activity of the atoms participating in molecular interaction engineering for quality product formulation. The wavefunctions that depict the electronic intensity appear to tune the action of the adhesive agents on the solute, reducing the size and increasing the surface area and available surface charges along with sufficent surface activity. The nanosizes of the constituent units