

## Polymerization in fluidics and stabilizable bio active molecular complexes of variable structures

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### Abstract

Fluids are bio active molecules which exhibit special chemical and physical properties. Dielectric properties lead to multiple reactions, aggregation or polymerization. The life is a special polymerized molecular structure, environmental modification that completely depends upon concentration gradient. The transition alters the states of fluids - gels -soft matter- matter and visa versa. The nutritional elements in the life cycle of the plants and animals results several polymer structures. The P<sup>H</sup> of plant sap and blood alters the body structural properties. Proper proportions leads to the stable structures can be standardized as good health and deviation defines hazards in health conditions. This paper sounds keen observation of natural and synthetic polymers and polymerization. Body health is directly proportional to intake of nutritional ingredients and environmental conditions. It is also depends upon molecular stress, strain, orientation, temperature with other physical properties inside & outside. Stabilization of the body & required elemental compositions specifies the environment, nature of food, medicinal buffering systems. [Nature and Science. 2009; 7(4):51-57]. (ISSN: 1545-0740).

**Key words:** Buffer, Cell Structure, Elements, Enzyme, Fluids, Polymer

### Introduction

The nature reflects its every content in terms of several states of the matter. Matter is made up of smaller units like atoms and molecules of fluids and solids. Fluids are having property of flow with bio active sensation. The proper proportion of molecular complex compounds with a chance factor is life. The life is complex molecules; exhibit the special property of growth and sensational moments with character of reproduction. Life is chance factor which is a proper combination of fundamental elements (Punchabhuta's) having history of 5000 yrs. [Vedas] civilization. Civilization is united by diversity of life and its distribution. Nature is blooming with several kinds of life unites like plants, herbs, shrubs, microorganisms, creatures, insects, birds, animals.....etc. Human beings are intellectual creature who is making best use of the nature & its products for his survival, since from the older days. Skill full way of using easily available herbs, Serbs, plants, food grains and natural resources to maintain the good condition of the body, Height to weight physic, leading spiritual satisfactory life by natural exercises like yoga, to sustain healthy peacefully longer life, is best art of living[Charka & Susrth].

This science of life is called Ayurveda. The natural food habits and spiritual thinking's, meditation, exercises like yoga are cultivated processes & recycling from older days [Veda's and Ayurveda]. All modern developments are the summary of the old ideas still requires the refreshments. Ancient concepts of the clear ideas lights up the new better intelligence and techniques. Every individual has unique in nature and their secrecy of the health lies secret only. The supreme guides of the Ayurveda are *Charka* and *Sushrut Samhitha* and both with more condensed form *Asthang hridhaya*. Some times Ayurveda is called the summary of the *Righ* and *Athara* Veda, because 10572 &5977 hymns explain use of herbs, serbs, anatomy, physiology, diseases & surgery etc. Sushruta was a famous surgeon. Classification of the various

diseases and critical operation at eye, nose, heart and brain etc. still making highway for the modern medicines and surgery. Detailed explanation of the intake, health hazards and remedy is a quite amazing one. After clear observation of the natural “Ayurveda” today’s modern medicine and the developments in the surgery is a just few steps of progress only. Today’s imbalanced chemical combination drugs, costlier surgery affecting the struggling body for the more uncertainty. Once again more persons are just looking back history of the natural treatment

## **Discussion**

### ***Polymerization and life***

Life started with very first simple subunits as monomers, linking together forming many complex polymers. This difference in polymerization kinetics is sufficient to create patterned structures like RNA & DNA towards the protein synthesis and the cell like structure with membrane and micro-organisms by self replication. Several modification and reproduction is resulted changing in life nature. The choice of different factors like initiator, initiator concentration and light intensity directly affect the rate of photo initiation and, subsequently, the rate of polymerization.. During polymerization, the growing length of the polymer chains causes an increase in the viscosity of the reaction mixture. The increase in viscosity leads to a reduction in the mobility of the growing kinetic chains or macro radicals. The universal solvent water plays a major role in metabolic activities, supported by light, heat, wind, pressure and gravitational energies[1-2].The environmental conditions supports the life for the proper growth is called as healthy growth and ideal environment. But earth’s motion and seasons enforces the physiological changes and variable metabolic activities in the life. Human beings are intellectual creatures making best use of raw nature and several adaptation skills.

### ***pH and buffers***

Patterned hydro gel structures have potential application in micro fluids[2-4] tissue engineering[5-7] and other soft matter technologies. The molecules of the fluid are acidic and basic state plays key role in every process. Hydro gels have been widely used for a variety of biomedical applications due to their biocompatibility and tissue-like physical properties[8]. Specifically, patterned hydro gels have been used to design micro fluidic devices with stimuli-responsive channels [9,10] cell-based micro arrays[11,12]. Water is nothing but  $H^+$  and  $OH^-$  ions acts as universal solvent. The pH of aqueous solutions has main role in metabolic activities. Which is a temperature dependant directly affects the biomolecular process. The control of pH in biological systems is achieved by the action of efficient buffering systems, due to metabolic production of acids (lactic) and bases(ammonia).The pH of the blood in venous limits 7.36 to7.4 and of arterial 7.38 to7.42. The viscous fluid blood flows through the veins by capillary flow method optimizing the body pressure. For healthy body every part or the cell is having communication by special nerves and controlled by the brain. Healthy mind leads to the healthy body. The buffering systems are  $H_2CO_3$ ,  $HCO_3^-$ ,  $HPO_4$ ,  $H_2PO_4$ ,  $HBO_2$  etc. potantates and protein present in blood, lymph and spinal fluids & exudates. Biological fluids contains  $Ca^{+2}$ ,  $Na^+$ ,  $K^+$ ,  $Cl^-$ ,  $HPO_4^{2-}$ ,  $HCO_3^-$  with several other trace elements and compounds [13,14].These ions activities determines rate of reaction and chemical equilibrium.

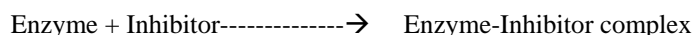
### ***Influencing factors***

The environmental conditions and their parameters influence the rate of reaction, mainly gravitational, electromagnetic radiations, heat, pressure, etc. The quantity and intake nature of food is directly proportional to the health .usually the fluids [15]. Colloidal & gel like mass structures accelerates the rate of reaction and liberation of the energy. The difference of concentration gradient and equilibrium position attains by diffusion, osmosis through the cellular membrane. The macro, micro and nano molecular clusters with polar molecules automatically balance the rate of reaction. The in & out flow, the intake food, quantity, form, time and environmental conditions influence the rate of reaction. Every body is having its own resistance towards the variation. Imbalanced adsorption of the polar molecules that results irregularities in health like fat formation, calcium crystals, tumors [17], excitements, high & low b.p, mental disorders and other health hazards. The extent to which an enzyme’s activity is limited to a certain

substrate or a certain type of reaction is referred to as the specificity of the enzyme like superoxide dismutase, catalase – the fastest enzymes which act together to protect cells against oxidative stress.

### ***Proteins and Enzymes***

Proteins are polymers with amino acids as their monomers. Amino acids are carboxylic acids with amines attached to the carbon. There are 20 common amino acids but one amino acid (glycine) are chiral, with the alpha carbon. Those used in the body are always the L stereoisomer. Most amino acids differ only in the composition of the side chain[18]. Regardless of their many different biological functions, all proteins are chemically similar. Proteins are polymers of amino acids & have nonpolar side chains, neutral side chains. Two or more amino acids can link together by forming amide bonds, usually called *peptide bonds* when they are in proteins. This structure alone determines the overall shape of a protein molecule, whatever its size[16]. Structure of angiotensin II is a blood-pressure regulating hormone present in blood plasma. Enzymes are catalysts for biological reactions the reactant in an enzyme-catalyzed reaction is known as the enzyme's substrate to protect cells against oxidative stress. Many enzymes include nonprotein portions known as cofactors in such enzymes; the protein part is called an apoenzyme. Only the apoenzyme and cofactor together are active as a catalyst. The cofactors are either inorganic ions usually metal ions, or small organic molecules called coenzymes. Modern understanding makes it clear that most molecules are not rigid, but flexible. The E-S interaction is better described by Induced-Fit Model. Since enzymes are composed of only L-amino acids, they catalyze the reaction of only one pair of optical isomers. Lactate dehydrogenase catalyzes the removal of hydrogen from “left-handed” L-lactate but not from “right-handed” D-lactate. Enzymes must be able to respond appropriately to the constantly changing conditions as we eat, sleep, exercise, or fall ill. Any process that starts up or increase the action of an enzyme is called activation. Any process that slows down or stops the action of an enzyme is called inhibition. Inhibition of several types is important for natural enzyme control can also be utilized in medications that modify enzyme activity. Many drugs rely on enzyme inhibition for their therapeutic effect. Some inhibitors are poisons because they prevent an enzyme from carrying out a necessary function. Some molecules could bind to the enzyme's active site and thereby prevent the usual substrate from binding to the same site [7, 14, 18]. As a result, the enzyme would be tied up. The inhibitor competes with substrate for binding to the active site – competitive inhibition[20]. Competitive inhibition is reversible.

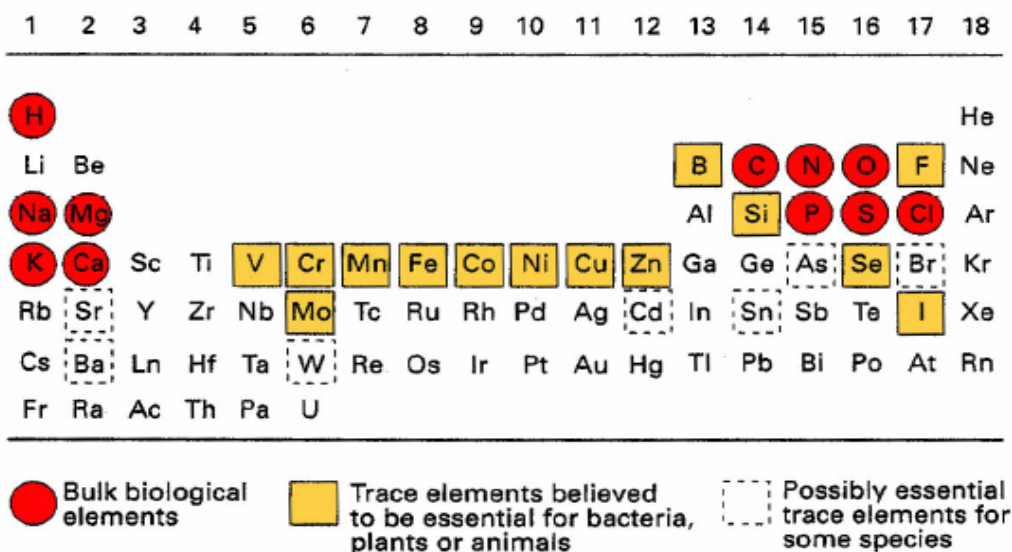


If the bond between an inhibitor and an enzyme is not easily broken, the result is irreversible i.e, inhibition – enzyme cannot return to an active state. Most irreversible inhibitors are poisons e.g. heavy metals such as Hg or Pb bind covalently to the sulfur atoms in the –SH group of cysteine. Phosphate-containing insecticides such as malathion and phosphate- based nerve gases like sarin are irreversible inhibitors of the enzyme Acetyl cholinesterase (AChE).

### ***Elemental compositions***

Conservation laws of the nature always true forever. The nutrients of the plants depend upon the traces of the elements and compounds present at that place. Metabolic activities of the bio molecular cells remain same irrespective of life class. But the ingredients differ according to the polymerization. The birth of life - food cycle-development-saturation-biodegradation maintains the flow of trace elements almost constant. But the scarcity & aggregation defines the special occasion. The special aggregation of the atoms and molecules is the complex molecular polymer and dielectric properties increases in the polymerization[20]. The bio-active stabilized proper proportion biomolecular complexes are grouped broadly by common characters in plant and animal kingdoms sub groups with different class and categories for easier understanding. The following figure shows the essential trace elements present in a organisms and single cell.

### Essential Elements in Organisms



The 11 bulk biological elements are approximately constant in all biological systems and they constitute 99.9 % of the total number of atoms present.

Fig.1: Essential Elements in Organisms shows different composition

### Metal Ions in a Single Cell

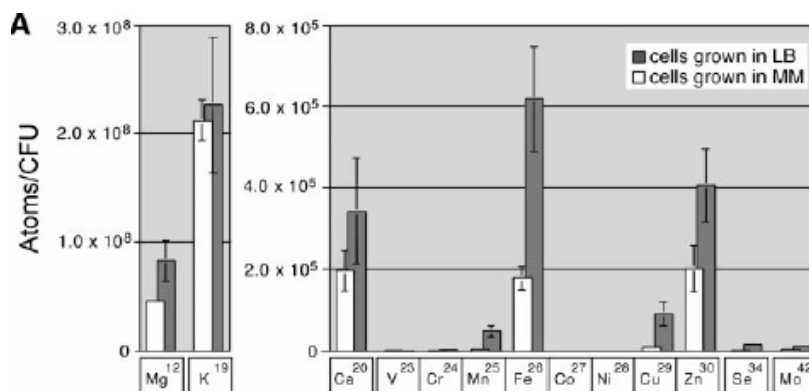


Fig.2 It is possible to detect the number of metal ions in a single cell by inductively coupled plasma mass spectrometry (ICP-MS). The results shown above are for *E. coli*. [21].

The above two figures show that the fundamental elemental composition of any organisms. The red color circles specify the essential bulk biological elements in all biological systems reflect same number of atoms. The yellow square specifies the trace elements required for the bacteria, animals and plants. But

the dotted square possible essential trace elements towards limited species. The atomic configuration and developmental aspects in each tissue depends upon the dielectric properties of units and subunits of the cell structure. However the tissue engineering [7,14,18] is the very complex phenomenon cannot be predetermined. The metal ions in a single cell is detected by E.coli by ICP-MS is shown in the figure 2. The multicellular structures of proper proportional elemental composition in a cell almost remain same (E.coli). The rate of cellular aggregation with different tissues of the bodies of proper elemental composition reflects the variable structures. The constant rate of polymerization results the time dependant stable structure. But the abrupt variation rate of reaction leads to the instability and decay. However environmental influencing factors are many & some times it is a chance factor. That is why we observe the same species with different weight fractions. The figure 3 shows the elemental gram weight fractions in the 75 kg human body for specified functions.

Metal	g/75 kg	RDA [mg]	Function
Ca	1100	800-1200	Structure IT
K	170	2000-5500	CT and IT
Na	100	1100-3300	CT and IT
Mg	25	350-400	Structure Isomerase Hydrolase
Fe	4-5	10-20	Oxidase O <sub>2</sub> -Transport O <sub>2</sub> -Storage e <sup>-</sup> -Transfer
Zn	2-3	15	Structure Hydrolase
Cu	0.08-0.12	2-3	e <sup>-</sup> -Transfer Oxidase Dismutase
Mn	0.02	2.5-5	Photosynthesis Hydrolase Reductase Structure
V	0.02	/	Nitrogenase
Ni	0.01	/	Hydrogenase Urease
Cr	0.005	0.05-0.2	Glucose- Metabolism?
Co	0.003	ca. 0.2	Oxidase Alkyl-Transfer
Mo	< 0.005	0.15-0.5	Nitrogenase Oxidase

**Mineral Elements** { Ca, K, Na, Mg }

**Trace Elements** { Fe, Zn, Cu, Mn }

**Ultra Trace Elements** { V, Ni, Cr, Co, Mo }

## Conclusion

Fluids play a key role in every life process. Their dielectric properties and concentration gradient results in aggregation of the molecules. The molecular aggregation defines several structures. The polymerization is influenced by several factors. The rate of the reaction depends upon elemental composition & the environmental condition like light, wind, humidity and water that alter the concentration gradient of the fluid molecules. The fluid molecular stress and strain generates the temperature. The proper knowledge of elemental composition of nutrients, food and medicinal systems stabilizes the polymer structures. Polymers are part and partial units of life.

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