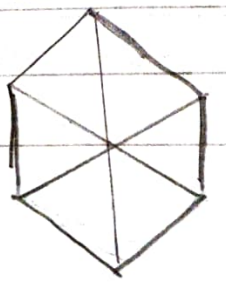
ASSIGNMENT -1

12/11/2022

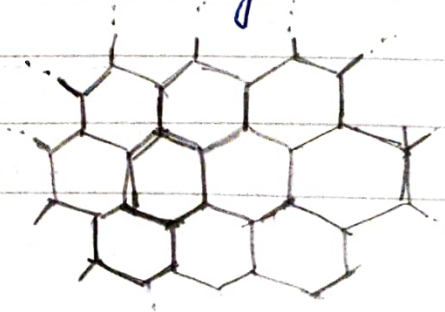
(1) According to recent theories about Universe, matter originated from a Big Bang which occured approximately 14 bya. All of the matter in cosmos was compressed in a single point, from where it bursted and strewned throughout the black void. Earlier different civilisations, — Greek, Egyptian, Indian had varying views about the origin of matters. The philosophers connected matter with a mythological significance.

The word 'matter' originates from the sanskrit word 'matra' meaning dimensions.

(2) If we want to tie a 2D surface, we will use a triangle (3sides). Because of it's symmetry, we can group triangles into a hexagon and further making hexagons, we can efficiently and closely cover any 2-D surface, without leaving any voids. Nature likes to use the minimum resources to achieve a task.



→



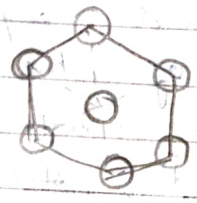
(5) Mathematically, a regular hexagon is made of 6 equilateral triangles

~~We use this sym~~

Hexagons have many types of symmetry (we can see from the structure of Benzene)

In ~~Euclide~~ Euclidean plane, hexagonal tiling ~~is~~ is a regular tiling of hexagons where exactly 3 hexagons meet at each vertex.

Smooth spheres, when arranged in hexagonal close packed structure, achieve the highest packing density because of it's beautiful symmetry and minimising the void space (~ 26%).



(3) If there were no symmetry, then we won't be able group the elements in the periodic table anymore. The periodic table, won't be 'periodic' any more, as there won't be any periodicity in elements. Each 118 elements would react differently, and have different properties. We won't be able to predict more elements, if there were no symmetry in operation in our world. The periodic table would like a discrete collection of elements.

(6) Indeed chemistry is the central science. It helps us to understand the very structure of reality. The chemical cornucopia is truly extraordinary. Chemistry is the central tree, which is continually spreading it's branches into new fields.

Chemistry —

- is growing all the time.
- creates new directions in science.
- interacts with society continually.
- serves humanity.

chemistry, in some forms or the other, has been practiced and is evolving for several centuries. Beside Mathematics, chemistry was involved in deciding the materials for constructing the architectures, like we see and in metallurgy, like we see in Indian history. One of the main aspects of chemistry, that has played a major role in the development of subject relates to structure. The faith in structure forms the chemistry is the central science as it connects the dots of Physics, Biology, Earth science and Mathematics. Today every scientists use atleast some chemistry to research in various interdisciplinary areas of science. In this way chemistry is the central science.

(10) Chemical reactivity depends on the dynamic structure. Object A is extremely stable, means A has a profound static structure. As B is not stable at all, it will be more reactive and aggressive towards other elements. B has a more dynamic structure. Stability is relative. It is always

defined ~~as an~~ with respect to a frame of reference. Even helium under extreme conditions, ~~to~~ reacts, to form (HeH). There is nothing such as absolute stability. Lowest state of entropy is not possible. If that would happen; the order of nature will cease to exist.

(7) Intrinsic symmetry is what determines the structure of atoms. The orbitals are symmetric about the nucleus. Chemistry would not have existed today, as we know it if there were no intrinsic symmetry in ~~orgi~~ the origin and design of ~~elemen~~ materials. The primordial universe would likely to have existed. A randomly scattered ~~sea~~ sea of ~~lept~~ leptons, quarks and ~~bo~~ boson without any order and symmetry. Protons and neutrons would not have existed.

(8) Nature, ie the entire cosmos uses parsimony to construct structure. As we move forward in time from the Big Bang, the culmination is the formation of the structure of matter.

In nature structure can be formed in 2 ways

(i) Top-Down → Scenario

Where a big discrete chunk of particles existed, and then random fluctuations caused it to move apart and order into small symmetric species.

(ii) Bottom-up scenario – discrete
Here small clusters merge together to form a structure.

(8) ~~The solar system~~
The early atomic model, is quite similar to the solar system.
In the sky the motion of sun is periodic – like a wave, ~~It's because~~



It's a beautiful depiction of symmetry of nature. ~~The circular The It~~ ;
similar symmetric properties are ~~exhibited~~ exhibited by the elements of our periodic table.
~~Be~~ Because, underneath all the reality, there is a matrix of order, ~~with~~
~~The~~ From the quantum to the grandest scales of ~~cosmos~~ there is always a 'pattern'.

(2) Structure is a function of symmetry and time. Symmetry occurs in the context of parsimony. Nature is very thrifty. she uses parsimony to create the structure of ~~parsimony~~ reality. ~~&~~ She uses ~~uses~~ the minimum materials to maximise productivity. Periodicity arises from symmetry. In this way periodicity and parsimony are related to the origin of matter as we see today..