WHY DO SOLIDS HAVE A CRYSTAL STRUCTURE?

ABSTRACT.

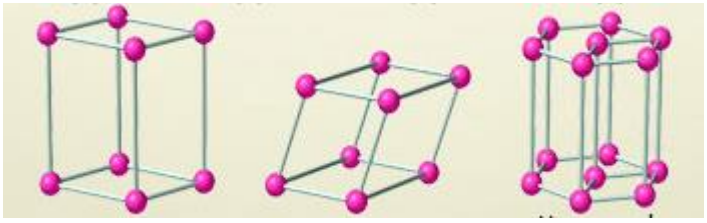
It has been shown that a crystal structure of solids is an necessary precondition for their existence.

Atoms in gases and liquids move in a random motion, whereas in solids, this motion is highly ordered. In these bodies atoms are arranged in an ordered scheme repeated in all three spatial dimensions. In the volume of the body, atoms occupy strictly defined areas, they can moce and collide only along strictly defined lines. The question arises. Why is this happening? Physicists do not provide even a substitute of an answer to this question. What is worse, physicists do not even ask themselves this question. They just take it as it is. After all, there must be a significant cause of this situation. Model 31 explains it in a simple way.

Atoms of all bodies constantly process particles of dark energy into energy quanta. The role of these quanta is to prevent atoms of all bodies from bonding into a single body. Figuratively speaking, each body is an engine in which the combusted fuel is dark energy, and the product of this combustion (exhaust gas) is energy quanta. After coming into being and fulfilling their role inside the bodies, energy quanta, like all exhaust gases, are released to the environment. This process:

- is a precondition for the existence of the Universe in its present form,
- manifests itself as an electromagnetic (thermal) radiation,
- occurs at any temperature,
- is not dependent on the presence of other bodies,
- **cannot be stopped, it can only be slowed down.**

Slowing down the release of quanta to the environment increases their concentration inside the body, that is it causes self-heating of the body (an increase of its temperature). Moving and colliding atoms of the body emit energy quanta, but at the same time they are obstacles slowing down the outflow of the quanta from the inside of the body, by which they contribute to an increase of the intensity of self-heating process. Distances between atoms in gases and liquids are large enough that they do not constitute a significant obstacle in releasing heat to the environment. Yet the situation in solids is more difficult. The concentration of the atoms is already so great that they constitute a real obstacle in releasing heat to the environment. Such bodies should undergo the process of self-heating. In order not to allow the bodies to overheat, nature "invented" a crystal structure. In the crystal lattice, emitting quanta atoms of a solid do not make random movements, as it happens in a liquid, but they move and collide along the same strictly defined segments which constitute the edges of various polyhedra in a solid.



It results in the fact that inside the polyhedra there are empty spaces through which, with an increase in the body size, the increasing number of quanta can freely leave the body. Figuratively speaking, a crystal structure of a solid causes that it becomes "transparent" for the quanta of energy emitted by this body. This "invention" causes that in bodies of a crystal structure, an increase of their temperature practically cannot be observed with an increase of their size. In other words, solids would never come into being without a crystal structure. This process played a fundamental role in the process of the formation of the terrestrial planets, including the Earth. The smooth surface of the planets cooled down and solidified in the form of rock crystals. These rocks unobstructedly removed the heat from the inside of a planet, thereby allowing it to cool down and solidify from the surface deep underground. If the structure of the rocks was not crystal, the process of solidification of the surface of the planets would have never occurred.

A CRYSTAL STRUCTURE OF SOLIDS IS AN NECESSARY PRECONDITION FOR THEIR EXISTENCE.