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STUDY OF RELAXATION PROCESSES AND THERMAL PROPERTIES IN POLYMERS

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ABSTRACT

At present, the main objective of the Republic of Uzbekistan is to develop its scientific and technological potential, create favorable conditions, in accordance with the strategic objectives and priorities of the reforms in the economic and social spheres, as well as to increase the level and quality of scientific and technical development of the country. The production of polymer products plays an important role in the economic development of our state. The rapid socio-economic growth of the polymer industry of Uzbekistan determines the improvement of energy and resrus saving plans in the existing technological processes or the improvement of existing production methods or production of polymermaterials with new regimes, high physical mechanical and utilization characteristics from physical chemical methods.

KEYWORDS: *Polymers, Physical Properties, Sress, Chain, Temperature, Relaxation Phenomena, Appliances, Mechanical, Electric, Magnetic, Optical, Structural Structure, Elastomer, Amorphous Linear, Superposition, Electrolysis Reaction, Explotation, Viscosity.*

INTRODUCTION

The first section of the fourth volume of the works of the president of the Republic of Uzbekistan Shavkat Mirziyoyev called “from the national revival towards the national revival” was called “the most important task of bringing the level and quality of life of our people to a new level”.

To this end, in order to raise the economy of the Republic of Uzbekistan independently and reduce the penetration of imported products and raw materials, the study of the peculiarities of relational phenomena and heat in polymers is an important basis for the strengthening of their solubility in increasing the quality of polymers. **[1]**

It is known that different physical properties of polymers (mechanical, electric, magnetic, optical, thermal) show them molecular motility, adhesion and elastic properties, which depend on the specific structure of the structural structure and chains. When using products from

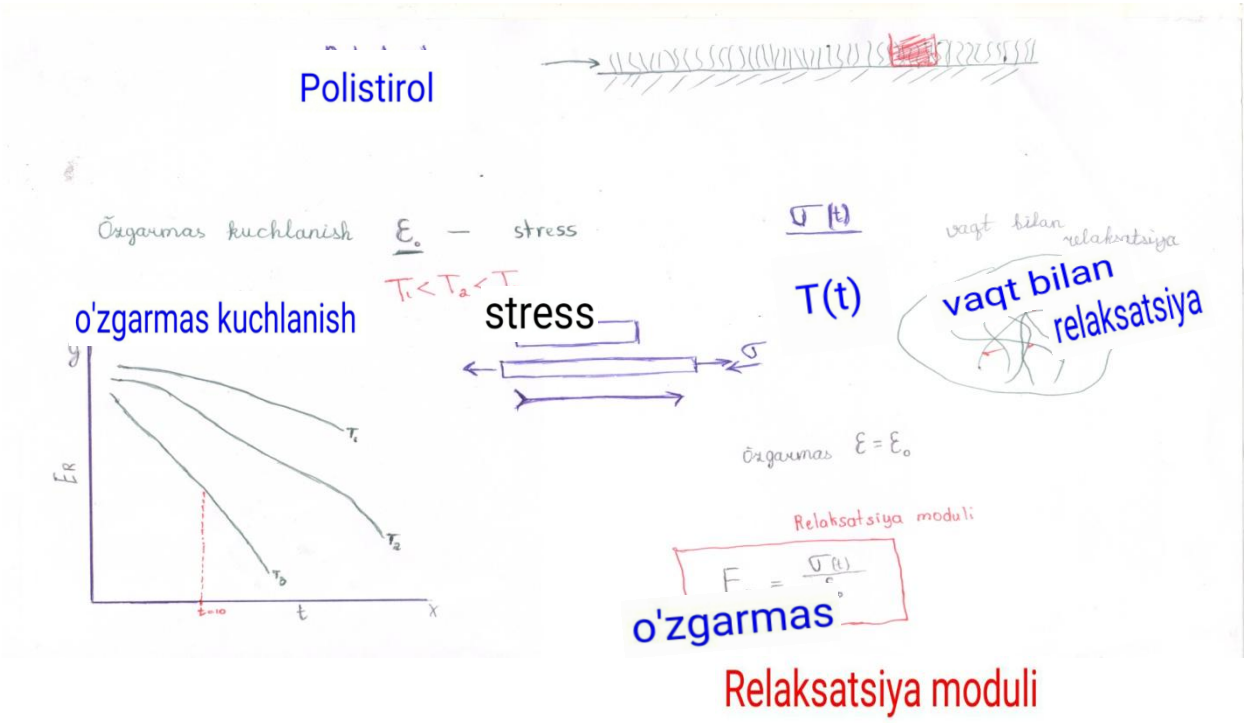
polymers, it is necessary to pay attention to both cases when it is possible to cause a malfunction with a temperature over time, that is, it is necessary to know the effect of sress softening.

A gradual decrease as a result of a decrease in voltage means a decrease in the tendency to return to its original form after removing the load from the polymer materials. During the period of slowing down the process in the deposition of polymers, physical changes occur, for example, disruption under the voltage of elastomers, reconfiguration of chain links and re-leveling through the last movement of zanzir. It involves the process of disintegration and reposition of bonds in polymer materials. Reduction of voltage and oxidation, electrolysis reactions also occur and occur as a result of the breakdown of polymer chains or the breakdown of mutual bonds. **[2]**

In amorphous linear polymers, the molecular net, connected by interpolar forces, forms physical nodes of the shift structure. In polymers that form elastomers by chemical bonding or resin bonding, the molecules are bonded together with a solid bond

The structure of different polymers is also different: in polymers with a linear network, sutured and structure, the processes of relapse also lead to a different course. It is aimed at increasing the physical and mechanical properties of polymer products.

When we put a table or any hard object on the carpet and take it back after a certain time, we see that the top of the carpet has become a rag. If we take the table standing on the carpet for a short time, the rags on the carpet will quickly return to their condition. If the table on the carpet is standing for a longer time, for example, the 1-th year table will push the rug neatly inside, which indicates a severe tension. To quantify this situation (t).Or when the fibers stretch, the stress will relax over time as a function of time. **[3]**

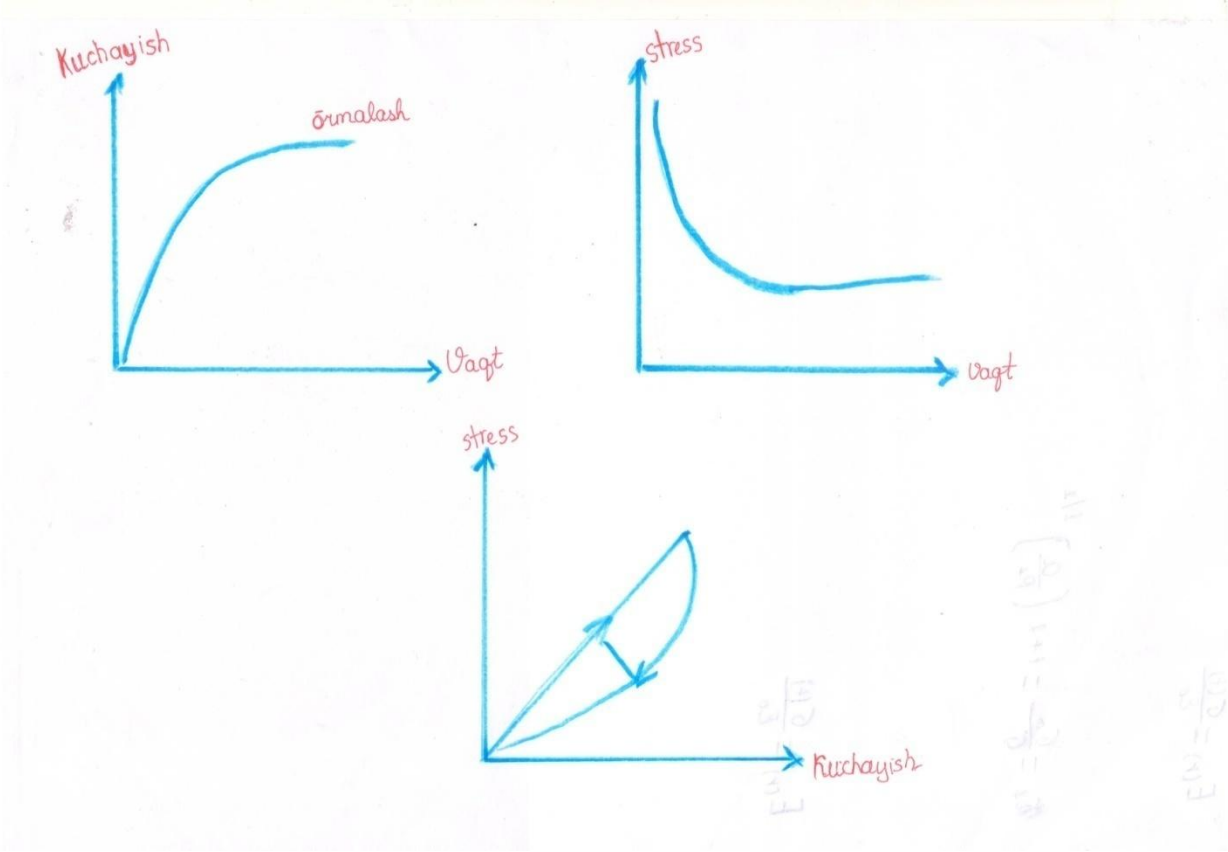


Another example: if we see guitar tuning, when we adjust the tension of the string , the length of the guitar does not change over time,but the more time passes, the stress decreases. It turns out that guitar strings, nylon strings at least go out of tune, even without changing the humidity or temperature on the guitar.

$$E(t) = \frac{\sigma(t)}{\varepsilon_0}$$

$$E_r(t) = \frac{\sigma(t)}{\varepsilon}$$

Polymer materials are materials in which the properties of tension and deformation depend on time or speed. It is determined by three properties the first decrease is determined as a time-dependent increase in the deformation of the material under creeping and constant tension.



This can be illustrated graphically by the voltage on the ”Y“ axis and the time on the ”X” axis. When the load on the polymer is affected, the initial rapid deformation occurs, which is gradually smoothed over time when the load is quickly obtained. The second viscoelastic property is the loosening of stress, which is characterized as a decrease in the stress of the polymer depending on the time at the influence of constant tension. So, we have stress on the ”Y” axis and time on the ”X” axis. Under constant tension of polymers and over time, the stress on this polymer decreases. The final feature of this elastic material is hysteresis, and here is the tension and tension curve in the elastic band. The material is loaded into the polymer and then unloaded, it goes the other way in the unloading cycle, and this difference means the release of

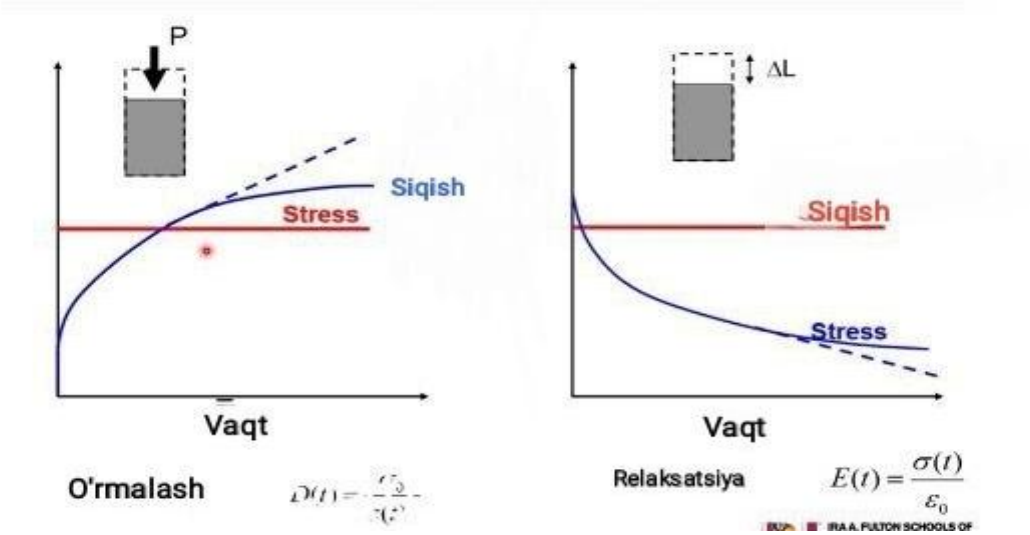
energy. In clinical practice, a reptile sample in orthopedics may be a newly implanted polymer for complete hip replacement within the first 12 months. It passes through the ingestion and then comes to a stable state. After that, wearing can be measured from the point of view of relieving stress. When we put the metal in the thigh bone, the bone relaxes the stress and this condition allows the nail to heal. **[4]**

Another example is that if we break steel pieces, we can see where it is elastic. When we tighten hard, a fracture of the neck occurs, here we can think of a real creeping and slowing down. You can see what is happening so that the voltage applied to the line decreases. You get a variable amount of voltage, so that the reduction in voltage is applied at a constant speed. Reduction of tension is a process that occurs with constant tension.

For example, if you fill the food bag with the product but stand in one place without lifting it will not break, but when we lift it will stretch it is equal to 1,5 + 2 as the fault of the rising curvature of the "KT" is the factor of the decrease of this voltage. The factor of greater voltage reduction usually leads to faster failure due to fracture. And the best possible "KT " occurs when the radius and curvature are equal to each other. So this happens for a circle, and this will give you three "KT". Thus the factor of intensity that it gives is given by this equation. **[5]**

$$K_t = \frac{\sigma_m}{\sigma_0} = 1 + 2\left(\frac{a}{p_t}\right)^{1/2}$$

Now the units we have are given by Pascal meter ,the Pascal Square is given to the root meter or the square root node "PSI". At us Giga Pascal can be something like a square root meter or a square root node "KSI". However, this is a parameter without measuring "Y", which holds the meter up to 0,5 or the node 5 points, depends on the crack furnace, the sample size and the application of the load. Thus "K" can be given a comparative situation in which there will be stress and rupture. Thus, this "K" is not a stress intensity factor, but it can be called fracture resistance. So, the sample is loaded with 50 "KSI " and has a length of 0,5 node crack.



If we check this process in the laboratory conditions, we can put a piece of polymer into the voltage control machine and see that the voltage is stopped. So the voltage is set at a certain

value, which we determine. Our observation of the relapse process in most polymers. We can thread the sample by putting a tight load on the polymers. We will observe how the polymer will look over time when the load is placed on the polymer. We know that polymer molecules can overcome weak secondary stresses and pass through one another. We call a special number relaxation module, which characterizes the relaxation of polymers. Thus, the R becomes "E" with the sign, which is determined by dividing the stress due to time into the voltage that is put on the sample. This gevs, eme module covers many sizes-10,100,1000,10000 ... large covers the data of the scale to determine the time interval I by taking a drawing or value log on the logarithmic axis, and when we pay attention to the curves, we will also witness a decrease in the basic stress, time function. If we give the temperature to the system, we observe that "T" is less than 1 "T" is less than 2 "T" is less than 3, that is, we can see a further decrease in the slope as you reach a higher temperature. **[6]**

If we determine the time, for example, we can observe what voltage will be for each temperature in 10 seconds, and we can make a relaxation module relative to the temperature. And now we draw a relaxation module for 10 seconds for different temperatures. In low temperatures, polymers become brittle kinetic energy or thermal energy is not enough in the vibrations of these molecules to eliminate secondary interactions between the chains. Thus, polymer molecules are mostly locked in their places. Moles cannot slip from side to side, so they are held in one place, and then become stiff and brittle. At high temperature, however, the polymers are dissolved, and the moles can pass side by side as a viscous stream, a stream of bone. We will need to determine the melting temperature of each polymer. High-density polyethylene is more easily crystallized and has a higher resistance to temperature than low-density polyethylene, low-density polymer has less crystallization. Molecules in high-density polymers are closer to each other and have more chances to establish secondary interactions for shunning. Thus, secondary interactions in amorphous regions become less frequent. If we start at a low temperature, all the moles are crystal and amorphous, they are all locked in place, and when we continue to raise the temperature, we see more movement of the moles, and the first thing we see is that it takes enough energy to overcome the secondary interactions between the moles in the amorphous region. And we observe a rapid decrease in the rest module. So heating is the release of amorphous zones. In order to eliminate the secondary interactions between the amorphous regions of the molecule, sufficient energy is required "TG" when we continue to heat the temperature of the swelling, the same thing happens when the "TM" is heated. Heating it is the discharge of amorphous zones. It happens in crystal regions, so they can overcome secondary interactions in the between of molecule.

The process of relapse this is the process of switching the system from an unstable state to a thermodynamic state of equilibrium under the influence of internal forces, the process of restoring the equilibrium over time.

Any process of relapse moves through time. The time of relapse is determined by the law of exponential growth.

The speed of coming to balance depends on the likelihood that the system will shift from one equilibrium state to another. The reason for the transition is different, for example, in liquids there is a continuous re-grouping of moles (moving from one place to another) under the influence of thermal motion.

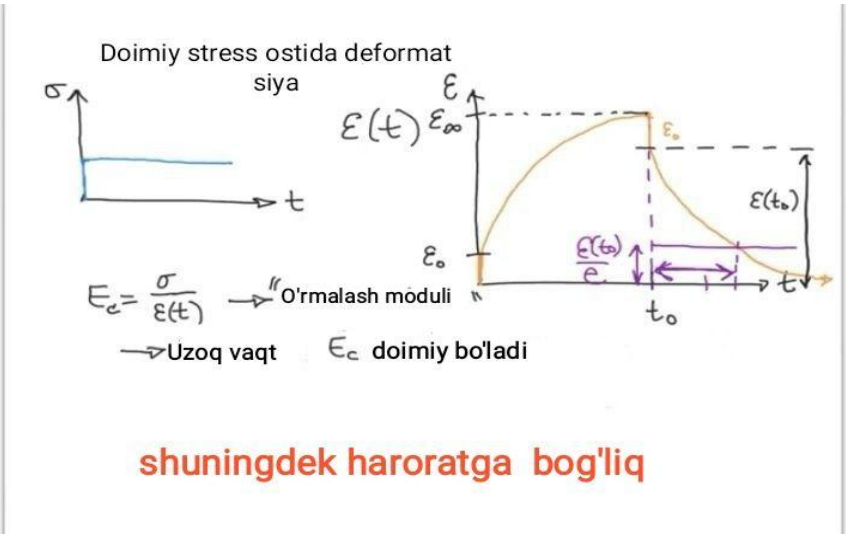
The mechanical properties of polymers depend on additional pressures. The additional voltage that occurs requires a certain amount of time to pass to the high elastic state (straightened) of the rectified and rotated molecular chains and thus to the tissue state of the macromolecule, so that the balance is not quickly adjusted.

The duration of the relapse process also depends on the temperature. When the temperature drops, the relapse process is slower.

Polymers are structural elements that differ from each other in size and mobility: the chain consists of link tributaries and chains itself. The dimensions of links are close to the size of the lower molecular compounds.

If the link did not combine with each other as a chain, then the mobility of them under the influence of thermal conductivity would be similar to that of the lower molecular compounds. Since the links are tied with a chemical bond in the chain, their movement is limited. In the case of high elastic of high molar compounds, the mobility is very large, so the re-grouping of links takes place at a considerable speed. Polymer chains have low mobility due to the fact that their dimensions are very large, and the time of their relaxation is very large. **[7]**

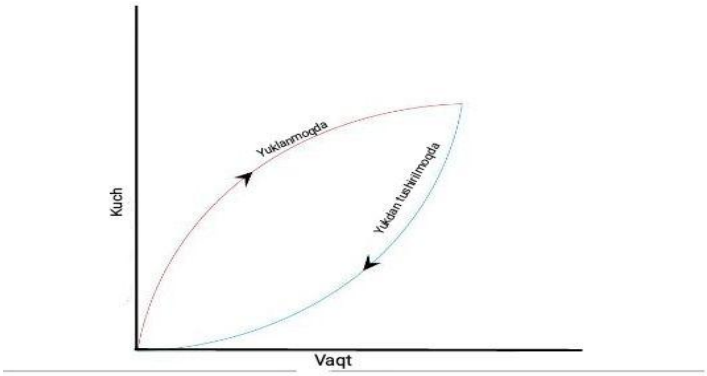
When we consider the process of deformation relaxation of linear polymers, elastic deformation is formed when the load on the polymer is affected high shear deformation develops slowly, in this case, straightening and reversing of the molecule occurs this process goes very slowly. Deformation by pulling the load from the polymer will be equal to the sum of the upper elastic.



Another manifestation of relapse is this phenomenon of hysteresis. Hysteresis means delay, lagging behind. Hysteresis is a “residual” property that appears in the body under the influence of external force. 3 type of hysteresis is different. Magnetic, dielectric, and elastic hysteresis. Magnetic hysteresis residual magnetism is called magnetism when the magnetic property of the body remains under the influence of an external magnetic field. A hysteresis that occurs when a dielectric variable is placed in an electric field is a dielectric hysteresis. Due to deformation, that is, when the elastic solid-body load is gradually increased and then reduced, the phenomenon of

hysteresis occurs, which is due to adsorption and desorption phenomena, the chemical process graph forms the leaves of hysteresis.

Different materials indicate different levels of elastic hysteresis. Solid metals show less hysteresis than materials with high elongation, for example, elastomers. The high-speed test produces significant results because the forces in the sample are greater in shorter stretches, and then in the same stretch there is a faster decrease in the load when lowering the load. The softening ability of the material can be found by dividing the elastic hysteresis of the material into the energy of its elastic deformation. By comparing the possibilities of elastic hysteresis of different materials, engineers can make sure that they use the appropriate material for the intended application. For example, a rubber with a more pronounced hysteresis is able to dissipate a large amount of energy and can be a good choice for absorbing vibration or sound.



Hysteresis module.

Thus, the sequence of technological processes is awarded for the implementation of modern technologies, which are produced in many ways in order to obtain a harmful product in the network of the production of waste polymers, we support the technology of production of finished products.

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