Methods And Physico-Chemical Fundamentals Of Toxic Waste Recycling In Local Conditions

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These days of advanced science, mankind's need for vehicles is growing. In turn, the car industry is developing year by year in the world and in our country. According to statistics, in 2017, there were 83 cars per 1,000 people in Uzbekistan. In neighboring countries, the figure is much higher: for example, in Kazakhstan - 250 cars per 1,000 people, in Russia - 334 cars per 1,000 people. In Uzbekistan, it is planned to increase this figure to 237 cars per 1,000 people by 2025. Along with the increase in the number of vehicles among the population, the number of tires that are disposed as waste after the end of their service life is also increasing. Waste tires, which were already used, are currently used for a variety of purposes among countries around the world.

The forecast for the annual volume of solid waste generation in the Republic of Uzbekistan is estimated at 14-14.5 million tons. Given the average population growth rate of 1.5%, this figure could reach 16-16.7 million tons by 2028. Urbanization also affects waste generation, the population of urban areas emits more waste than the rural population, such a growth rate of solid waste generation reflects the living conditions of the population and the growth of the republic's economy. However, the need for a systematic, programmatic approach to the modernization and improvement of the system of solid waste management is even more pressing. Because without such an approach, it is impossible to solve problems in the field. [1]

The best way to reduce environmental pollution is to dispose of these obsolete car tires and reuse them as a secondary raw material. In the world experience, there are the following ways to destroy and reuse obsolete tires:

- storage and disposal of waste in warehouses;
- decorative (use for various purposes, planting flowers, in the formation of various ornamental forms);
- burning for various purposes (in the production of cement and bricks);
- processing as a secondary raw material.

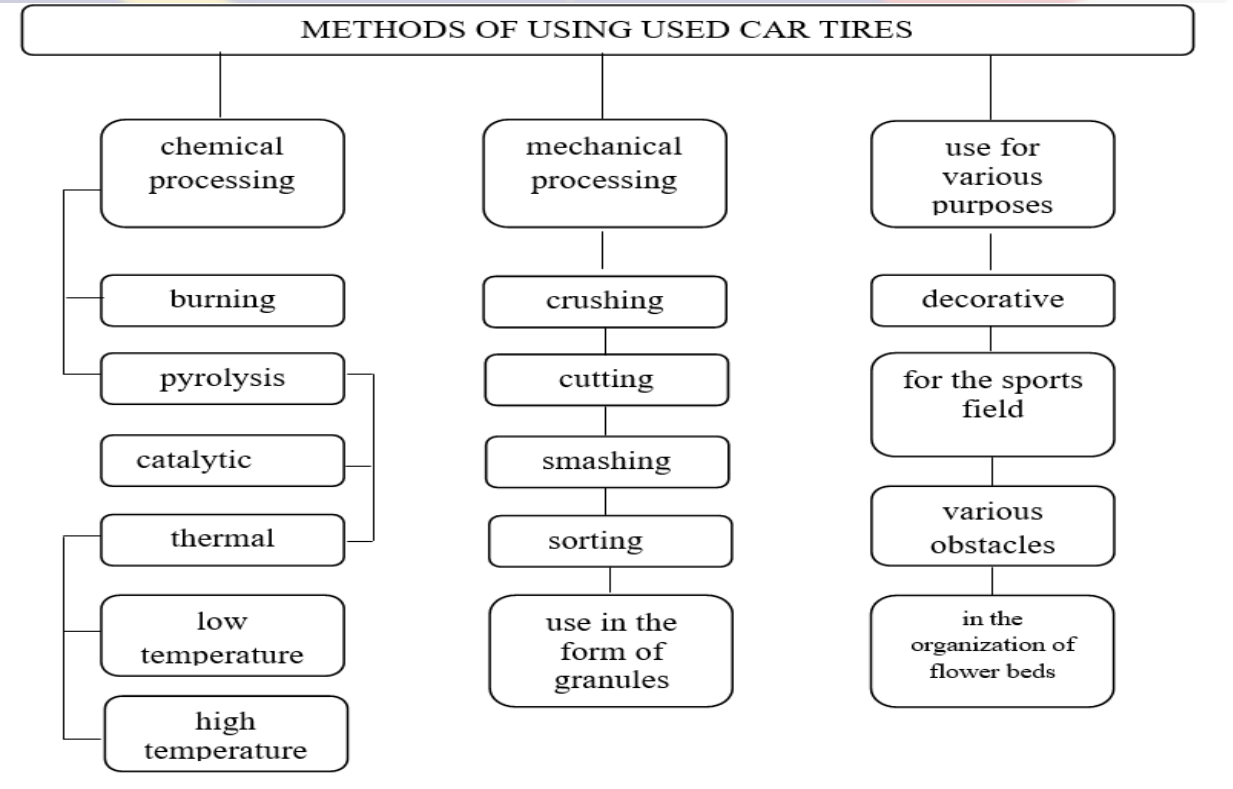
An analysis of existing domestic and foreign experience in the recycling and disposal of obsolete car tires shows that the most promising way to dispose of used tires is to recycle used tires to obtain products necessary for the national economy or industry.

During the research, the components of the waste tire were studied. Accordingly, the composition of the car consists of substances such as synthetic rubber, technical carbon, resins, oil. This means that various products rich in hydrocarbons can be obtained by recycling tires composed of these compounds.

When each hydrocarbon is broken down, products are formed that are unique to its elemental composition. In addition, what product is formed also depends on the parameters of the pyrolysis process. The output of pyrolysis products in the specified composition of the raw material and the composition of the resulting mixture are a function of three unrelated parameters.

The pyrolysis process proceeds by heat absorption. When the products of the primary reactions accumulate in large quantities and their concentration is sufficiently high, the importance of the secondary reactions increases. There is a time difference between the first and second stage reactions, so in order to keep the main components to a maximum, the reaction mixture is cooled sharply. The result is a sharp condensation of liquid hydrocarbons, the main product of the process.

The parameters of temperature and pressure determine the selectivity of the pyrolysis process.



The degree of selectivity is the ratio of the output of the main products (liquid phase) to the output of less important products (gas phase).
As the temperature value increases and the pressure decreases, the degree of selectivity increases.
Hydrocarbons are thermally unstable compounds. Another important parameter of the pyrolysis process is the time in which the hydrocarbons undergoing pyrolysis are in the reaction zone. The time in the reaction zone is the time in which the raw material is in the zone at which the pyrolysis reaction takes place at high speeds. The output of the final products exceeds the maximum values for each temperature, depending on the time spent in the reaction zone. As the temperature rises, the optimal value of the time in the reaction zone decreases inversely proportional. Thus, an increase in the pyrolysis reaction temperature leads to a relatively high yield of the main products, while simultaneously reducing the time spent in the reaction zone accordingly.
As a result of the study, it is recommended that the finished products obtained by pyrolysis of car tires can be used for the following purposes:
1. Liquid fuel product is a substitute for synthetic fuel used as liquid fuel for boilers. The obtained synthetic fuel can be separated into fractions for the production of various petroleum products (gasoline, diesel fuel, oils, resins, etc.) using the rectification process using it as fuel oil.
2. Solid carbon residue (technical carbon) - this product can be used as a raw material in the production of surfactants, as an additive in the manufacture of paints, as a filler in the rubber industry.
3. Gas is used as an additional fuel to heat the process, in the production of electricity using heat generators.
4. Metal - The metal extracted from the process contains high quality steel. Used as a raw material in the metallurgical industry. [3]
Thermal decomposition of high molecular weight hydrocarbons is a complex process involving many elementary chemical reactions that proceed sequentially and in parallel. The mechanism of the chemical reactions that take place in the pyrolysis process is quite complex and their level of complexity goes with the increase in the molecular weight of the hydrocarbons obtained for pyrolysis and the degree of conversion. The reactions that take place during the pyrolysis process take place in two stages. In the first stage, the decomposition reactions of the raw material components, which have a radical chain mechanism, take place. This results in products such as alkanes and olefins, which have a relatively shorter carbon chain. In the second stage, reactions proceed with a relatively complex mechanism. This produces liquid products with a high molecular weight. According to the radical chain mechanism, dehydrogenation of hydrocarbons and the formation of free radicals lead to carbon chain disruption reactions. Free radicals tend to disintegrate and regenerate. The decay of free

radicals always follows a b-bond relative to the free electron atom. The above two steps are basic. Given the ratio of the rate of separation of hydrogen atoms from carbon atoms and the number of atoms in the paraffin molecule, it can be said that the composition of the pyrolysis products of hydrocarbons is sufficiently formed in the process.

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