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INDUSTRIAL ECOLOGY

Pretreatment of Recycled Polymer Raw Material

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Abstract—The analysis of main methods and equipment for physical utilization (recycling) of polymer waste is performed. Main stages of the recycling as storage of waste, transportation, crushing and grinding, fractionation, sorting, washing, dehydration, agglomeration,and granulation are considered in detail.

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The annual production capacity of polymers and materials utilizing them has reached within last fifty years almost 300 million tons [1, 2]. The widespread use of polymers and plastics also results in the problem of the utilization of waste appearing during the time of production, storage, and use of various products and materials. For example, only in Ukraine 35 mln m^3 of municipal solid waste is collected annually; they are subjected to burial in 770 waste disposal grounds with the total area almost 3000 ha and are partly burned at incinerator plants [3]. The fraction of polymers in these waste is 6…7% (mass).

In many cases of the policy of waste treatment the five-stage hierarchy of the waste management is recognized: prevention of waste; secondary use; physical processing; energy and chemical processing; safe distribution or burial [2].

The third way nowadays is the most appropriate from the point of view of saving of the material and energy resources as well as solving ecological problems. At that one of the most responsible stages of physical processing of polymer waste (recycling) is the pretreatment of them which can be characterized by significant difficulties connected first of all with identification, sorting, and cleaning of the mentioned waste. Not without reason it is foreseen by the EU directive on recycling and packaging of waste (2004/12/EU) that by the year 2012 the EU member states should reach only 22.5% of recycling of waste of polymer packaging [4]. Therefore the selection of rational technology and appropriate equipment for pretreatment of polymer waste is a quite urgent issue.

The purpose of this article is to give an overview of methods and equipment of pretreatment of polymer waste for its further utilization by physical processing (obtaining new products therefrom).

The processing of thermoplastic materials with the use of recycled raw material includes three groups of processes: preparation, formation and final processes [2]. The most important of them are the preparatory processes; the quality of the product obtained with the help of forming and final processes to a significant degree depends on them. Storage, transportation, crushing and grinding, fractionation, sorting, washing, dehydration as well as preparation for further processing [2, 5, 6] are usually regarded as preparatory processes. (At that, some of listed processes may be absent, in particular, in case of processing of stable by quantity and quality secondary raw material, for example, in case of processing of certain type of unpolluted packaging which comes from the chain of supermarkets, such stages of mentioned technology as sorting, washing, and dehydration might be absent).

In typical technological line of the production of granulated product from the waste of thermoplastic polymers and plastics (Fig. 1) [2, 5] the initial raw material is supplied to the delivery table; impurities are removed there, and the polymer constituent is transferred by a band feeder to the crusher. The crushed raw material is supplied by the screw transporter to hot washing, and then, consistently, to friction and flotation washing. After the wash and removal of the main moisture the crushed raw material is dried and supplied into the extruder. The strands formed by the extruder are cooled, crushed, and in the form of granules are supplied to storage hopper. Depending on the composition and condition of the initial raw material the illustrated scheme can be adapted.

STORAGE OF WASTE

The processor should have a certain amount of the reserved raw material for production from the secondary polymer raw material at condition of possible non-agreement between the consumption of raw material and its supply. At that methods of storage of raw material depend first of all on its form and size. Thus, the raw material of two types is supplied: ground and non ground. In case when the raw material is supplied non ground (bulky raw material), in a form of film, rolls, sheets, containers, tanks etc. it is often pressed in bales for better storage of raw material and decrease in volume. Multi-chamber vertical and horizontal presses (depending on the direction of pressing) are used for that. Untreated bulky raw material which takes much more space is usually stored in metal containers [6].

The storage of ground waste can be wet and dry. At that the waste can be stored in open and closed storehouses. The problem of agglomeration of the particles of raw material can appear in case of dry storage. Also ground wastes are hazardous because of the possibility of spontaneous ignition. Besides, ground particles due to static electricity often stick to walls of the tank where they are stored. To remove this, different shaking devices, most often mixers are used.

There are the following types of storage of ground waste:

(1) Dry storage in industrial package. Most often this is the system of the industrial package type "big bags" (big bags). These bags which can be filled in doses by powder-like and granulated materials have sizes up to 1200 × 1200 × 2000 mm and can store up to 2.5 t. The operation with bags foresees the presence of the special equipment (batchers, transporters, conveyers etc.).

(2) Dry storage in cardboard drums (containers). Drums (containers) with volume usually up to 1.8 m^3 are produced from corrugated cardboard covered from inside by protective film. After filling such drum is covered with the cover made of waterproof cardboard or plastic. In section such drums can be round or octahedral. Unfilled drums can be often put together; after that they have a flat shape.

(3) Storage in dry bunkers. Dry bunkers are usually used after the crushing of polymer waste as collectors providing continuous feeding of raw material for further stages of the processing. Dry bunkers which have a form of closed ventilated containers are usually equipped with vertical propeller blade mixer which prevents agglomeration and sticking of particles providing at that appropriate homogeneity of the material. Dosimeters providing continuity of the output of the material are installed on

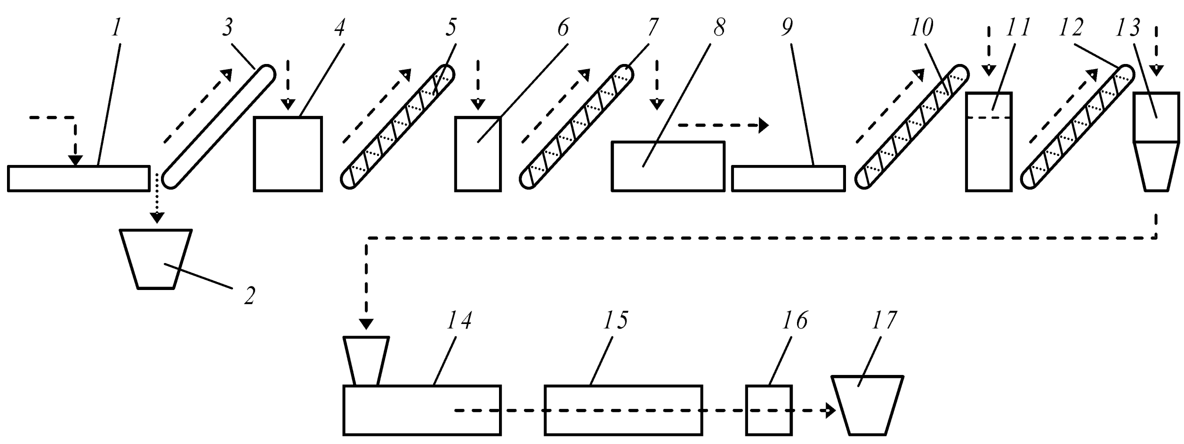


Fig. 1. Flow diagram of the technological production line of granulate: (*1*) the delivery table; (*2*) the bunker for impurities; (*3*) the band feeder; (*4*) the crusher; (*5, 7, 10, 12*) screw transporters; (*6*) the hot wash; (*8*) friction wash; (*9*) the flotation wash; (*11*) the washing device; (*13*) the drier; (*14*) the extruder; (*15*) the cooler; (*16*) the granulator; (*17*) the storage hopper.

outlets of bunkers.

(4) Storage in wet bunkers. Wet bunkers which are by their construction similar to dry bunkers are used as intermediate containers (collectors) between stages of crushing and washing. The water which also binds small particles is added into the bunker in order to prevent agglomeration of crushed particles. The disadvantage of wet bunkers is the tendency to separation of particles with different density that causes the necessity of continued mixing of the material in bunker.

(5) Wet storage in mixing containers. Theses containers are used as collectors between stages of mixing and soaking of the crushed material. The storage of wet raw material does not lead to formation of dust therefore it is possible to use open systems that makes the process of storage of the crushed raw material relatively cheap.

TRANSPORTATION OF WASTE

Diverse equipment whose type depends on the form and size of materials subjected to processing is used for transportation of polymer waste at all stages of processing. The transportation can be divided in two types: mechanical transportation and motion in the flow. In the first case the raw material is in direct contact with the mechanical device and in the second case it is two-phase system "raw material–dispersion medium" which is transported with the help of special means (most often pipelines). The dispersion medium at that can be both liquid and gaseous.

The mechanical transportation most often is implemented by conveyors: belt conveyors, bucket conveyors, vibrating conveyors, screw conveyors etc. The motion of the raw material in the flow is provided by pneumatic and hydraulic systems (suction, discharge, combined). At that hydraulic systems are applied in case of the presence of "wet" stages of the processing of raw material in a technological process.

CRUSHING AND GRINDING OF WASTE

Processes of crushing and grinding in principle do not differ. The crushing is conventionally considered to be such a process of the destruction of solids at the effect of external forces where the result of this destruction is the product with the size over 5 mm; the result of grinding is the product with the size 5 mm and less. The first type of destruction occurs in crushers and the second in mills.

The crushing and grinding (destruction) of polymer waste first of all is done for obtaining particles with necessary size and form in order to decrease the volume and perform further stages of the technology of the waste recycling.

The variety of the form, size and physical properties of waste materials (films, bottles, canisters, containers etc.) stipulate for appropriate requirements to the crushing equipment. At that the hardness, elasticity as well as thermal and mechanical resistance are the key features of polymers and plastics.

The destruction of polymer waste, as a rule, is realized by crushing, shifting, grinding, hitting, cutting, chipping, sawing (less often by cleavage, usually after or during cryogenic cooling) as well as by combination, for example, chipping with simultaneous cutting or crushing with shifting and grinding [7].

At that the polymeric and elastomeric materials by their properties and mechanism of destruction significantly differ from low molecular compounds, in particular, solid mineral raw material, because in comparison with solid mineral raw material the significant part of polymers and elastomers has elastic properties. Therefore with the aim of the economy of the energy their destruction is carried out both at low (cryogen) and higher temperatures (most often 80…100 °C).

The product obtained by cryogenic grinding usually has smooth surface that contributes to good flowability and miscibility during the time of its further storage and processing. The absence of thermal degradation of the product as well as the fire and flame safety of the process are advantages of this method. The main disadvantage is the significant cost of the cooling agent.

During the time of grinding of waste at higher temperature besides the possibility of the degradation of the material there is a problem of agglomeration of particles of the product; at that the application of special additives preventing agglomeration does not always have the desired effect.

The primary breaking of large-size waste is usually carried out in cutting and impact machines as well as in chipping machines where the material is destroyed by the combination of cutting and impact; and the final (as well as one-stage grinding of small waste) destroying is implemented in machines where the material is broken by cutting, sawing, grinding, shifting and their combined action.

The separation of the body of material in cutting machines is effected by cutting instruments (cutting blades). The process of cutting of materials and especially of elastic materials is quite complicated. Its parameters depend both on the material itself (dimensions, composition, presence of inclusions and defects) and characteristics of the cutting equipment (geometry of cutting blades and place of cutting, condition of the surface of blades) and the cutting process conditions (temperature, cutting velocity). The advantages of cutting choppers are the large range of sizes of processed waste, the possibility of obtaining of particles of stable size; disadvantages are the big noise, possible vibration, intensive wear of working elements, dependence of the efficiency of grinding on the intensity of the loading of initial material (loading can be both free and forced which increases the efficiency of the process).

Following types of cutting machines are widely spread:

(1) Guillotine cutters. They are made for prior cutting of packages, film rolls, and other solid objects.

(2) Mechanical or alligator scissors. They are made for cutting used car tires into 2–4 pieces as well as the other bulky objects. The motionless disc-shaped blade is installed on the base and the moving disc-shaped blade is installed on swinging around holder. The massive balance wheel is installed when cutting on the driveshaft for the uniform operation of scissors.

(3) Saws. Circular and band saws from high speed steel or saw band with carbide inserts end caps are used. The disadvantage consists in the possible heating of saw band and further sticking of the treated material on it. Saws also like guillotine cutters are used for prior cutting of bulky objects.

(4) Tire cutters. They represent drum type of chipping and cutting machines meant for grinding of big pieces of used car tires preliminary cut by mechanical scissors. On the main shaft of the tire cutter the drum with four plate knifes are installed; they are assembled in parallel to the motionless blade fixed to the base. Pieces of tires are supplied to the rotating drum by the drum with spikes and corrugated roller; then they are ground at passing blades of the drum through motionless blade. The shaft of the drum is fed by massive balance wheels. Fragments of tires cut on the tire cutter later on are directed to further grinding.

(5) Cutting mills (Fig. 2). Depending on the spatial location of the axis of rotor they are distinguished as horizontal and vertical. The cutting occurs between motionless blades of stator and rotating blades of the rotor. The sieve whose meshes determine the size of the obtained product is located under the crushing chamber. The sieve with square holes provides high productivity; the sieve with round holes provides more uniform size of particles of the product.

Blades in the mill can be fixed straight or aslant. The inclined position of blades provides the decrease in energy consumption and in noise as well as the increase in the lifetime of blades. Nevertheless the inclination of blades provides the shift of more heavy material to the side of

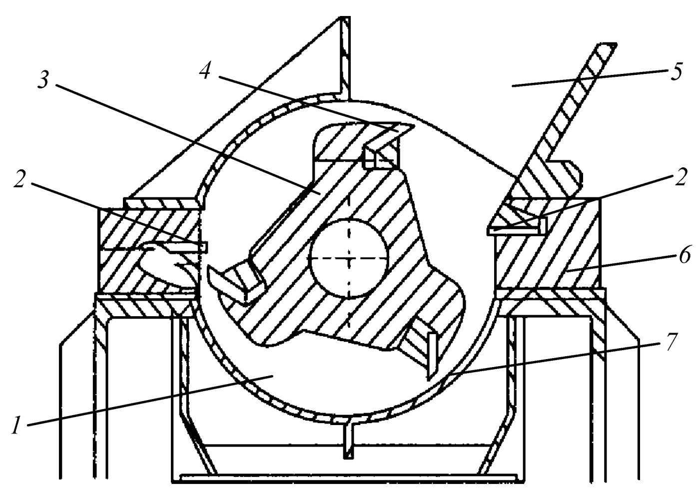
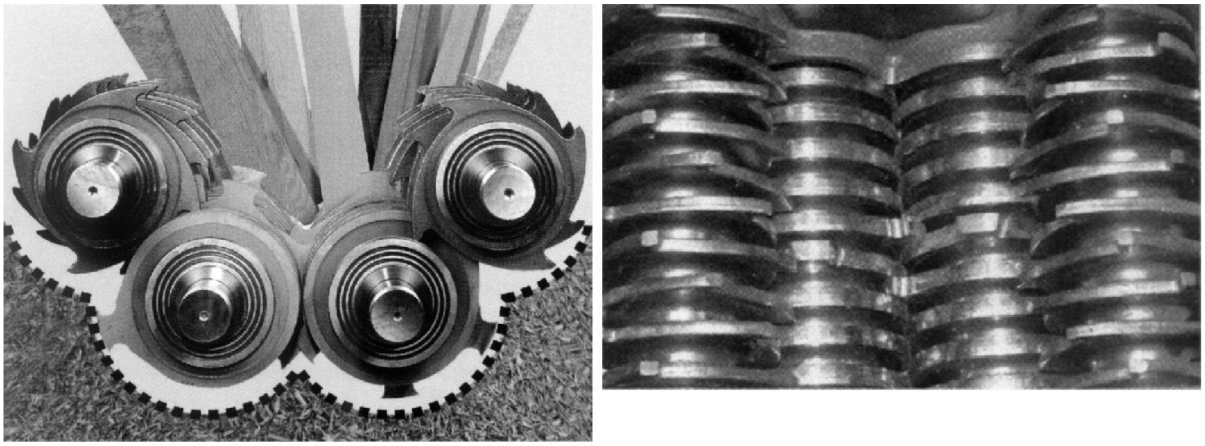


Fig. 2. Horizontal cutting mill: (*1*) the crushing chamber; (*2*) blades of stator; (*3*) the rotor; (*4*) blades of the rotor; (*5*) the feeding hole; (*6*) the body; (*7*) the sorting sieve.



(a) (b)

Fig. 3. Four rotor shredder: (a) the scheme of the operating chamber; (b) the view on rotors from the angle of the feeding bunker (Perfect technologies of crushing. Four rotor shredders series ZM 30-ZM 50: catalog, Ilsfeld (Germany): Weima Maschienenbau Gmb, [2008], p. 4).

the inclination of blades therefore such mills are used for processing of light materials.

Many decades rotor crushers of types IPR-100, 150, 300 and 450 with the possibility of crushing waste with dimensions from 80 × 120 × 250 mm in IRT 100 up to 800×325×270 mm in IRT-400 are successfully used at domestic plants of plastics processing. The productivity of the mentioned crushers depending on the material and form of waste is within 25 to 1500 kg/h.

Further developments of cutting machines are shredders: single, double, four and six rotor (Fig. 3) shredders where each rotor is equipped with the combination of discrete, but not elongated, blades; some of these blades cut narrow stripes of material and some of them after that cut these stripes. Therewith due the simultaneous action on the crushed material of significant amount of blades the absence of the vibration, hits and impacts can be provided. The crushing of the material is realized like by “fine cutting”.

(1) Impact crushers. The destruction of waste in such machines occurs through the transition of the kinetic energy of the operation body or body itself to the energy of deformation of destruction. In first case the closed impact takes place: the material is destroyed between two mobile working surfaces (usually moving and motionless, seldom between two moving); in the second case it is free impact: moving pieces of the material are destroyed both at impact with the working body of the machine and with each other. At closed impact the effect of destruction is determined by the mass of moving working body of the machine and the velocity of its motion in the moment of the impact; at free impact this effect is determined by inertia of the crushing body. The advantages of impact crushers are the simplicity of the construction and exploitation, low requirements to working bodies; disadvantages are the significant noise, vibration, intensive warming of the material, low dispersity of the obtained product, difficulty in crushing elastic and plastic waste.

Impact crushers are mostly used for crushing fragile waste, for example, thermosetting plastics. At the use of impact crushing for processing of thermoplastics the energy consumption is four–five times more than at the use of cutting mills.

This method of destruction of waste is realized in hummer and jet mills, impact grinding machines as well as in mills with notched discs, disintegrators and dismembratories [6].

(2) Crushers where the destruction is realized by grinding. The destruction of waste in such equipment is realized between bodies made, as a rule, in a form of circles (grindstones) or endless bands where the working surfaces are equipped with abrasive grains, pins, cogs etc. In order to decrease the temperature of the processed material its direct cooling with water is done. The advantage of these grinding machines is the possibility of processing waste without its prior separation on parts; the disadvantages are the “puttying” of working surfaces (especially with high roughness) by processed material and the necessity of further dehydration of the obtained product.

(3) Crushers where the destruction is realized by compression. This method consists in destruction of bodies during the process of their compression between

working bodies of the machine. Roll crushers where the destruction of materials occurs in the bite between two smooth cylindrical rollers with similar diameter rotating towards each other at similar velocity are mostly spread. The energy of destruction in this case depends on features of the processed material, dimensions of rollers and bite between rollers, velocity of the working surface of rollers. Advantages of these machines are the simplicity of the construction and exploitation; disadvantages are low productivity, significant energy consumption, the possibility of appearance in the product of elongated particles with length significantly bigger than the width of the bite.

Jaw crushers where the destruction of the material occurs between motionless and moving jaws are used for prior destruction of fragile materials.

(1) Crushers where the destruction is realized by compression with simultaneous shifting. In such crushers the destruction of the material in most cases occurs in the bite between two rollers rotating towards each other at different velocities. Often the working surface of rollers is corrugated and (or) rollers of different diameter are used for intensification of the process. The energy of destruction at that depends on features of the processed material, dimensions of rollers and the bite, geometry of grooves, velocities of working surfaces of rollers. The ratio of linear velocities of working surfaces of rollers (friction) as a rule is within 2.55 and 6. So, crushing rollers with corrugated rollers are widely spread for crushing of rubber products; the diameter of the front roll of the roller is 490 mm and the back roll is 610 mm at the length of rolls 800mm and friction of 2.55. The advantages of these crushing machines are the simplicity of the construction and exploitation; disadvantages are a low productivity and a significant energy consumption.

(2) Crushers where the destruction is realized by compression with simultaneous shifting and grinding. This method is usually realized in rotor crushers with cylindrical rotating working body (rotor) placed with small bite in relation to the body. Working surfaces of the rotor and the body are usually equipped with grooves. In this case the destruction of materials occurs through the grinding between lugs of grooves of rotor and body, shift and further breaking (rarely cutting) of large particles which fell into holes between grooves of the rotor and body or between other particles. These processes occur in conditions of the significant pressure created by the rotor, the grooves are made between the place of the loading of the initial raw material and the area of crushing. Rotor and body of the crusher are intensively cooled.

Advantages of rotor crushers are the satisfactory productivity and a wide range of materials for processing as well as relatively low energy consumption (2–3 times lower than at impact cutting crushing and 4–6 times at cryogenic crushing) [7]. Disadvantages are the complexity of the construction and exploitation, the possibility of agglomeration of crushed particles, the necessity of precise selection of operating regimes depending on features of the processed raw material. In recent years the constructions of rotor crushers is intensively developed; many of them are used both in research laboratories and in industrial plants (for example, Patent of Russian Federation no. 2167056, no. 2325277 C1, no. 2344037 C2, Patent of Ukraine no. 1427U, no. 1673U, no. 15854U, no. 40302A, no. 40351 A, no. 53728 C2, no. 54588 C2, and others). One of constructions of rotor crushers produced by Kiev PAT "SPE Bol'shevik" (Ukraine) DEKCHER-150 (dispersant worm extruder with diameter of rotor 150 mm) is illustrated on Fig. 4.

Together with crushing in order to decrease the amounts of the initial film raw material from polyolefins for further processing encapsulation is used; this method is based on cold pressing of the film waste.

The raw material is pressed in capsulator and then the pressed massive piece is cut in capsules usually up to 5 × 8 mm [8].

The treated material is similar to raw material and it is possible to mix it with initial material; the feeding hole is not blocked, the pressing force can be increased up to 30–40%. The mechanism can be attached to the production line or to operate in stand-alone mode.

FRACTIONATION OF CRUSHED WASTE

The prescription of this stage is the separation of crushed raw material by size and form of particles which is in most cases realized on motionless and moving sieves of different form (flat, drum, and others) as well as with the help of air flow (the method is based on different motion velocity of crushed particles in the air flow depending on sizes, form, and mass).

Roller fractionation [6] is used for separation from the mass of the crushed one-dimensional and two-dimensional raw material (for example, film) of three-dimensional objects (for example, caps of bottles). In that case several pairs of parallel assembled rollers rotate in opposite direc-

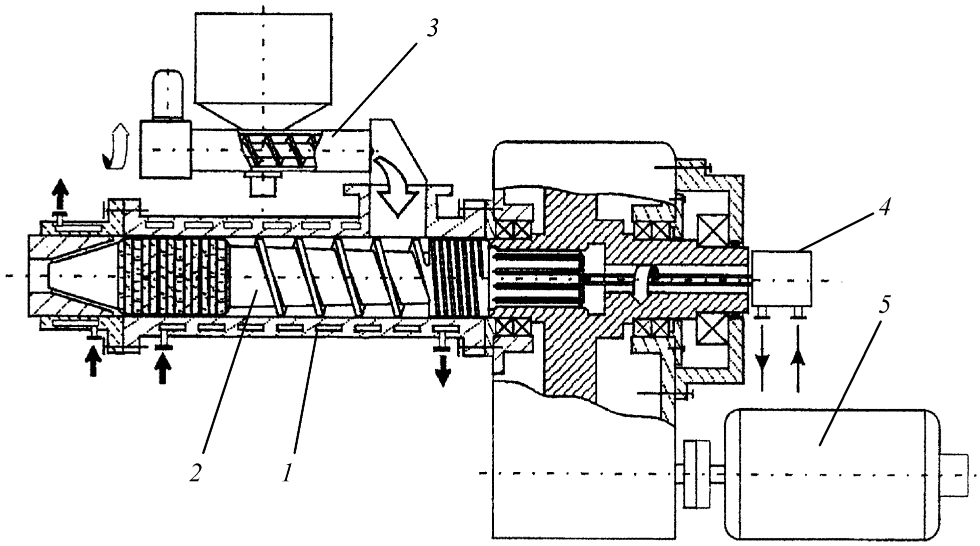


Fig. 4. Scheme of the construction of rotor crusher DECKCHER-150: (*1*) the body; (*2*) the rotor; (*3*) the dosimeter; (*4*) the cooling system of rotor; (*5*) the drive.

tions and draw out flat particles from processed mass. At that big fragments of the mixture remain on rollers and are removed from the device.

SORTING OF WASTE

If at fractioning the raw material is separated in fractions by the size of particles then sorting concludes in its separation by the type of material. The prescription of this stage is maximum separation of the material with certain features from the mixture.

There are many methods of identification of polymer materials; the most simple and reliable from them is preliminary marking of polymer product [5]. Nevertheless it is not always possible to use marking.

In practice, following methods of identification of polymers are used:

(1) for large waste there is an identification by existing marking; sorting by optical features (visual control); magnetic separation;

(2) for crushed waste there is identification by density; wetability; electric features; magnetic features; solubility; low temperature features.

One of the most spread methods of identification of large waste is sorting by optical features, which is often done directly by workers during the motion of the conveyor. The result depends on the amount of workers and their skills. In this way the glass, metal, film, bottles, paper, and cardboard are separated from the raw material.

The application of sensors during sorting by optical features is more advanced. Typical parameters of objects are determined after the treatment of the image or signal and compared with parameters of the sample programmed in the system. Sorting can be done by color, form, size, condition of the surface. In case of recognition the object with the help of manipulator with mechanical or pneumatic drive is thrown into collector or other conveyor.

One of the most simple and effective methods of sorting of crushed waste is sorting by density which is introduced into the field of gravitation (for example, by introduction of water or water–salt solution during the time when the raw material is in tank filled with liquid with known density), field of centrifugal forces (in hydrocyclones, settling centrifuges; the efficiency of separation in this case reaches 99.8%).

Another method is the sorting by different wetability: on the surface of particles of hydrophobic polymers which cannot be wetted there are air bubbles; as a result these particles float to the surface and can be removed from the water surface. Particles of hydrophilic polymers settle on the bottom of the tank.

During the sorting of particles of material with the help of electrostatics the electrical charge is supplied to the particles; this can be realized with the help of coronal discharge of 20…40 kV or by friction (triboelectric charge). Depending on features of the material of particles they take the charge with opposite sign and (or) value that is used for further separation of mixture.

The electrostatic sorting is the most appropriate for separation of polyolefines because they have close values of density and it is almost impossible to make their separation by density. The significant advantage of the electrostatic sorting is low energy consumption of the process and high productivity. Nevertheless this method can be used only for dry and clean raw material consisting of no more than two components. For multicomponent mixtures the electrostatic separation should go together with other methods of separation, for example, with separation by density.

The sorting on the basis of spectroscopic features of polymers and plastics requires the application of infrared and X-ray spectroscopy.

In combination with necessary software the infrared spectroscopy allows realization of fast collection of data, recording the spectrum within milliseconds, and effective analysis of components of the mixture. After recognition the plastics are thrown by the manipulator into the appropriate section of the device. Modern sorting devices identify up to 30 different polymer materials.

The X-ray fluorescence spectroscopy is based on absorption of the X-ray radiation generated by the special source. Passing from the excited to the ground state the atoms fluoresce at certain wavelength. Sensors are adjusted for the optimal sensibility to one chemical element, for example, chlorine. Thus, it is possible to separate bottles made from poly(vinyl chloride) from bottles made from poly(ethylene terephtalate) or polyethylene. The disadvantage of the method is impossibility of differentiation of poly(ethylene tetephtalate) from polyethylene (in this case the application of infrared spectroscopy is recommended). Other methods of sorting are less spread in practice.

WASHING OF CRUSHED WASTE

Washing is carried out for separation of impurities from the material. This process goes in three stages: (1) maceration; (2) cleanup; (3) separation.

The maceration significantly decreases adhesion of impurities to the surface of polymer particles. Mixing pools (opened or closed) or slowly blade conveyors providing necessary duration of wet processing of raw material are used for this stage.

During cleanup particles of dust are removed as a result of continues throwing over of the processed material. Too dirty raw material is cleaned in turbine or friction washing machines.

The separation, as a rule, is carried out in collectors. On economic purposes the worked out water after regeneration is used in closed cycle.

DEHYDRATION OF CRUSHED WASTE

This stage in needed after washing of waste in order to decrease the content of moisture in material before its further processing. The content of moisture of polyolefines, ABS-plastics and polystyrene should be no more than 1% (mass) and for polyamide, poly(ethylene terephtalate) and other polyester polymers due to possible hydrolytic destruction at further agglomeration or granulation should be down to 0.1% (mass).

There is mechanical and thermal dehydration (drying).

The mechanical dehydration is done for primary removal of excess moisture. It is realized with the help of filters or filtering centrifuges. The final content of moisture is: for bulky particles up to 5% (mass) and for flat (film) up to 10% (mass).

The final dehydration of raw material is carried out with the help of thermal dehydration (drying). At that, convective dryers including fluidized layer which prevent local overheating and thermal destruction of the material became most spread. The final content of moisture of raw material after drying reaches 0.2% (mass) and less.

AGGLOMERATION AND GRANULATION OF CRUSHED WASTE

The final stage of the recycling of polymer waste is the obtaining from crushed, sorted, cleaned, and dried waste of the material suitable for further use as raw material for polymer processing equipment (usually extruders) for production of certain products from processed for this purpose waste.

During agglomeration the partial melting of the material takes place; this causes the formation of particles with wrong form but certain dimensional range. At that usually two main methods of agglomeration are used: agglomeration at pressure and thermal agglomeration.

In first case the material subjected to agglomeration in condition of friction and sliding deformation between rotor and perforated body of agglomerator partly melts. Heterogeneous (by structure) strands of the material formed by perforation of the body are cut by rotating blade in cylindrical particles. By these way granules, briquettes and tablets are obtained.

Thermal agglomeration is applied, as a rule, to crushed films. The material is quickly heated to the temperature of melting and then quickly cooled. The "impact" cooling is done for this; it consists in direct adding of water in heated to the state of half melted polymer material which due to thermal tensions collapses in particles with different form and size. Big agglomerates after that are additionally destroyed [6].

More spread method of final stage of recycling of polymer waste is granulation with the help of extrusion equipment. There are hot and cold methods of granulation. In first case the melt which goes through the extruder head and cut in granules which are then further transported in hot state by the air or water flow and cooled simultaneously. In case of cold granulation formed and preliminary cooled in water bath strands go through pulling device and then in cold state are cut in granules.

At granulation of secondary polymer raw material usually extruders equipped with blocks of filtration (belt, disc, cassette and others) prescribed for separation from the melt flow of foreign particles which were not separated on previous stages of processing are used. (Thus, as a result of granulation it is possible to obtain cleaner material than after agglomeration where the complete melting of the material does not occur and consequently the realization of filtration is impossible).

The performed analysis of processes and equipment for preliminary processing of polymer waste for its further utilization by physical processing showed certain difficulties which processors of secondary polymer raw material can face (first of all consumption waste and mixed waste). At that one of the urgent issues to which the leading producers pay primary attention is the elaboration of new promising energy effective methods and equipment.

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