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Microwave-pasteurization equipment

The Electrotechnical Materials and Environmental Technologies Center has studied a new method for pasteurization of the fruit juices using the energy of microwaves.

The main components of the fruit juices are fructose, organic acids (malic, tartaric and citric acid) and mineral substances. The most interesting components are the vitamins and the aromatic substances.

Polyphenols are very important as they improve the consumers' health through their antioxidant effect, greater than in the case of the vitamin C and E.

Polyphenols are chemical substances that are encountered in plants and are characterized by the presence inside the molecule of several phenolic groups.

High quantities of polyphenols may cause the diminishing of the iron absorption in the organism.

The thermal treatment ensures the destruction of the pathogens and of the common flora in a 99,9% proportion such that the pasteurized juices will respect the standard norms. The pasteurization treatment also ensures the destruction of the natural enzymes that may cause modification during their storage.

Description of the process

At the beginning, the liquid will be absorbed from the storage tank by a pump, having a specific flow rate, and will be introduced in the heat exchanger for increasing the temperature to 54-57°C. The liquid will enter in the microwave chamber where the temperature will raise to 65-85°C (pasteurization temperature). The hot liquid passes through the storage container, it re-enters in the heat exchanger (ensuring the heating of the un-pasteurized liquid), it is cooled and is collected in a vessel.

Technological operations carried on during the pasteurization process of fruit juices

- qualitative and quantitative reception of fruits;
- fruits sorting and washing;
- fruits peeling;
- juice pressing and collecting;
- juice clearing;
- juice filtering;
- microwave pasteurization of juice;

- packaging;
- storage of the packed pasteurized juice.

Results

The following aspects were observed after performing the thermal treatment of the orange, grapefruit and apple juices:

- the organoleptic features (color, taste, flavor) aren't affected , only the aspect of the liquid, that , after pasteurization, indicates a separation of the phases;
- from the physical-chemical point of view, the changes that occurred aren't significant, except the vitamin C content that decreases when the temperature and retention time increase.

If, during pasteurization, the microorganisms are completely destroyed and the processing and packaging of the juices is performed in a sterile environment, these juices can be stored for more than 14 days at 4-5°C, and for 14 days at ambient temperature (not greater than 25°C).

See also:

- Microwave pasteurization of milk and cream.
- Recovery of whey as biogas.