THE EFFECTS OF STERILIZATION IRRADIATION ON PROPERTIES OF COMMERCIALLY AVAILABLE PET MATERIALS USED IN THE PRODUCTION OF VACUUM TUBES FOR BLOOD SAMPLING

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Blood test collection systems are typically polymeric or made of glass. However, glass test tubes can easily break, blood can spill, or some of the blood can be absorbed into the cotton swab that covers the tube. PET vacuum blood collection systems do not have this drawback. All system components (the tube, the needle and the holder) are disposable. Such systems are lighter than glass ones and are much less traumatic. However, due to PET thermal sensitivity, these products require "cold" sterilization methods, such as ethylene oxide (EtO) treatment or radiation. Ethylene oxide is a highly toxic and carcinogenic gas. The products are placed in a container filled with EtO, heated to 80-100 C. After the eight-hour exposure the gas was evacuated, and the product is ventilated for several days. Radiation sterilization is "cleaner", faster, does not require opening the original packaging and even shipping containers [1].

This research is focused on investigation of electron beam irradiation effects on PET polymers commonly used in medical devices, specifically vacuum tubes for blood sampling. Irradiation was done using 8.5 MeV electron beam, with total doses ranging from 5 kGy to 25 kGy. The first step of the project was to determine the sensitivity of the infrared (IR) spectroscopy method [2] when studying changes in the physical properties of the tube material.

The revealed post-radiation changes in the IR spectra [3] can be useful for determining the degradation of PET products properties during radiation sterilization with electrons. Electron paramagnetic resonance (EPR) spectrometry is planned to be carried out to obtain information on the concentration of forming radicals in PET, which in turn reflects chemical transformations. We also plan to investigate the effect of radiation sterilization on mechanical properties of products immediately after sterilization and later, to investigate their shelf life.

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