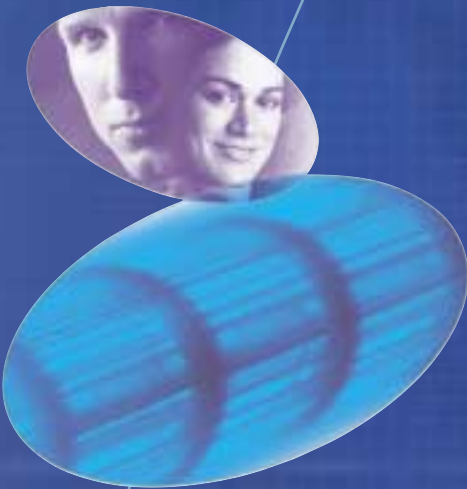




LABORATORY E-BEAM ETO GAMMA

GAMMA



CUSTOMER FOCUSED · QUALITY ASSURED



THE COBALT SOURCE

The radioisotope cobalt provides the energy source for use in gamma irradiation plants and is especially manufactured for the purpose. The process takes place in a specially designed cell, with walls and ceilings constructed of reinforced concrete up to two metres thick. This ensures that the radiation is attenuated so that there is no increase in external background levels. Cobalt 60 pellets

are sealed inside stainless steel cylinders. The overall assembly is referred to as a source pencil. These pencils are placed into a metal source rack located within the concrete cell. The source rack can only be in one of two positions: the storage position, which most commonly is within a deep pool of water, or in the raised operating position. During operation, the source rack is surrounded by product circulating on a conveyor

system. The energies given out by the decay of cobalt 60 are insufficient to affect the nucleus of the atoms. Therefore this cannot induce radioactivity in any material, irrespective of the length of exposure to the source.

A SOPHISTICATED PROCESS

Sterilizing products by gamma radiation is a sophisticated process, depending on the ability of gamma radiation to induce ionisation in the

THE FAMOUS “BLUE GLOW”

In 1958, the Russian physicist Pavel Alexeyevich Cherenkov, together with two colleagues, Ilya Mikhailovich Frank and Igor Yevgenyevich Tamm, was awarded the Nobel prize for Physics. Their award was for explaining the **Cherenkov effect**; the emission of blue light when atomic particles are passed through water and other transparent media at a speed greater than light in that medium. Cherenkov first



noted the phenomenon nearly a quarter of a century earlier. It is this same blue glow that occurs when our gamma sources are put in their storage positions in water. You are always welcome to visit us to discuss your specific needs and also to view this effect.



product. Industrial applications range from medical device sterilization to polymer modification at the molecular level. Energy from photons of gamma radiation is transferred to electrons in the target material yielding highly active electrons and highly reactive free radicals. In the context of sterilization it is generally accepted that these species induce breaks in the DNA double helix, preventing replication and hence sterilization. In appropriate circumstances the same ionisation process modifies molecular chains to enhance their physical properties. Improved heat resistance is an example of this.

MONITORING THE DOSE

A key characteristic of gamma radiation is its high penetration capability. This enables moderately dense or sealed products to be processed with relative ease. It also facilitates treatment of palletised product. The level of absorbed dose is calculated in units of kilo Gray (kGy). It is determined by product density and pack size, and to some

degree by plant design. The dose delivered is measured by a dosimetry system. In the system most commonly used, exposure to gamma radiation alters the complex dye systems in a Perspex dosimeter. This results in a darkening or increased optical density that relates directly to the absorbed dose. Process qualification, also known as dose mapping, validates the routine processing parameters; it also characterises the dose distribution throughout the product. Every healthcare consignment is given a Certificate of Irradiation. This shows that the product successfully completed the irradiation process within the agreed dose limits.

COMPATIBILITY SAFEGUARDS

Products for processing usually arrive at our gamma sites in their final packaging on pallets. They are processed on the pallets, or in aluminium containers commonly known as 'totes'. As the gamma process can affect some polymers,

it is essential to ensure process compatibility by assessing irradiated samples of finished product and packaging during the design and process qualification phase. Isotron has the capability to deliver specific doses to small volume product samples that are identical to those received during routine processing.

THE PARTNER OF CHOICE

For more than thirty years, Isotron has been the partner of choice for numerous clients in many industries. We provide solutions using the three principal technologies – gamma irradiation, electron beam and ethylene oxide, as well as microbiological testing, sterilization validation studies and a range of support services. All of our plants operate in accordance with International Quality Standards transitioning from ISO 9002 and EN 46002 to ISO 9001:2002. Whenever you have a requirement for gamma irradiation, or need assistance with sterilization matters, Isotron has the answer.

- **GAMMA**
- **ETO**
- ▲ **E-BEAM**
- ◆ **LABORATORY**
- ※ **PREVIOUSLY GAMMASTER**



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