

IONIZING VS NON-IONIZING

A CASE OF MICROWAVE MISREPRESENTATION

The question of microwave safety remains a topic of interest for those evaluating REV™ technology, despite EnWave having over 20 years of manufacturing and processing history and over 30 partners using REV™ Microwave Vacuum technology across the globe.

During technical discussions the question of microwave safety often arises. The short answer is yes – microwaves are safe for both the product (processed in a microwave environment) and the operators.

However, before diving into the details of microwave safety, it is first imperative to clarify the concepts of ionizing and non-ionizing radiation.

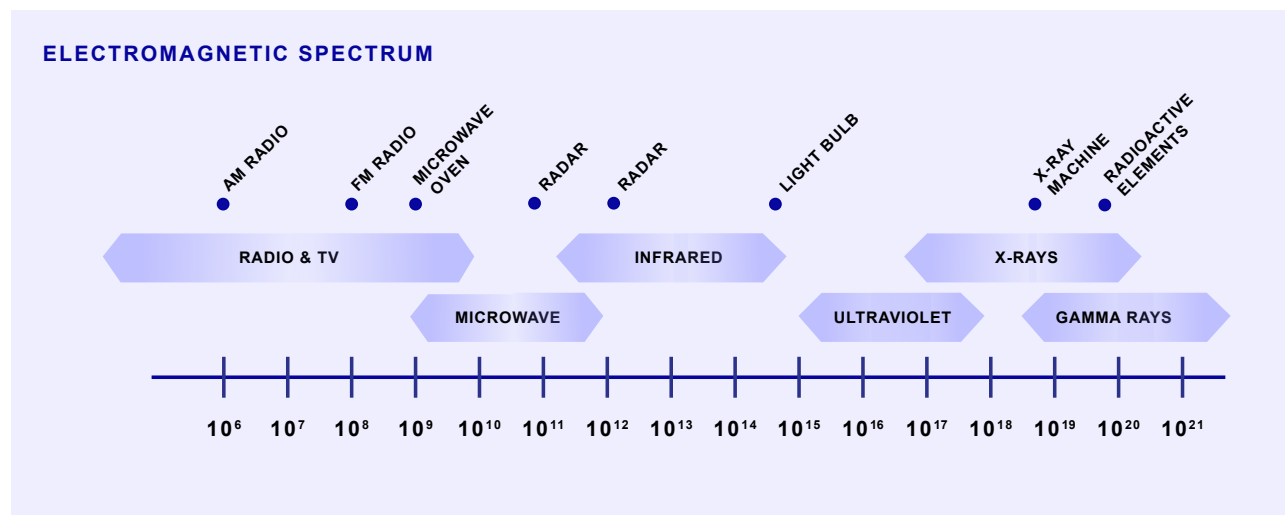
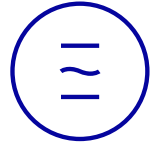


Image: Electromagnetic Spectrum



CLARIFYING THE CONCEPTS OF IONIZING AND NON-IONIZING RADIATION

Ionizing Radiation

Ionizing radiation is often used in the medical industry. This is the type of radiation often referred to by regulatory agencies when discussing [sterilization radiation](#) and often is found in the form of gamma rays and x-rays.

Ionizing radiation treatments are highly regulated because they contain enough energy to detach electrons from molecules and atoms. One of the many reasons for having strict control of irradiated products when exposed to ionizing radiation is that there is [scientific evidence that ionizing radiation affects DNA structures](#).

In the EU-GMP guidelines, specifically, [Annex 12](#) (EudraLex - Volume 4 - Good Manufacturing Practice guidelines), medical products manufactured using ionizing radiation are discussed and regulatory guidelines are provided.

Non-Ionizing Radiation

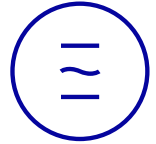
Microwaves are a type of non-ionizing radiation that is widely accepted as safe for processing different types of products, [including organic certified materials](#).

The World Health Organization considers microwave drying a [safe form of food processing](#); “when used according to manufacturers’ instructions, microwave ovens are safe and convenient for heating and cooking a variety of foods.”.

Certainly, as with any other form of energy, one needs to observe proper design practices to ensure safe operation.

For example, the design of the microwave devices must adhere to the recommended limits by local regulations. For example, in Canada, it is [1.0mW/cm² at 5 cm from all external points in the microwave oven](#) when operated using its test load.

It needs to be designed with sufficient and proper safety interlocks, and best sanitary practices must be observed for the handling of the materials being



processed. For example, food grade and microwave compatible materials.
By these standards, microwaves are safe, convenient and cost-efficient for food and plant processing when properly designed.

SAFETY PROTOCOLS AND FEATURES FOR ENWAVE'S COMMERCIAL REV™ DEHYDRATION EQUIPMENT

EnWave has over 20-years of experience manufacturing microwave equipment that operates within the requirements of each jurisdiction it exports to.

With multiple redundancies through safety interlocks, EnWave's equipment is safer than most home microwaves.

Machines are CE marked and the electrical panels are CSA approved. For Europe, the equipment complies with European Machinery Directive (Directive 2006/42/EC).



ADDITIONAL RESOURCES

For more information about REV™ technology and how it works visit enwave.net/how-it-works.

For more information on how REV™ technology can reduce the bio-burden for cannabis products without the use of off-site irradiation processes visit enwave.net/cannabis.