

Radiochemistry and Radiation Technology

Objective

To support Member States in strengthening their capability to produce radioisotopes and radiopharmaceuticals. To support Member States in applications of radiotracers and radiation technology for industrial and other uses, and in application of nuclear analytical techniques to address environmental challenges.

NUTEC Plastics: Innovative Technology for Upcycling

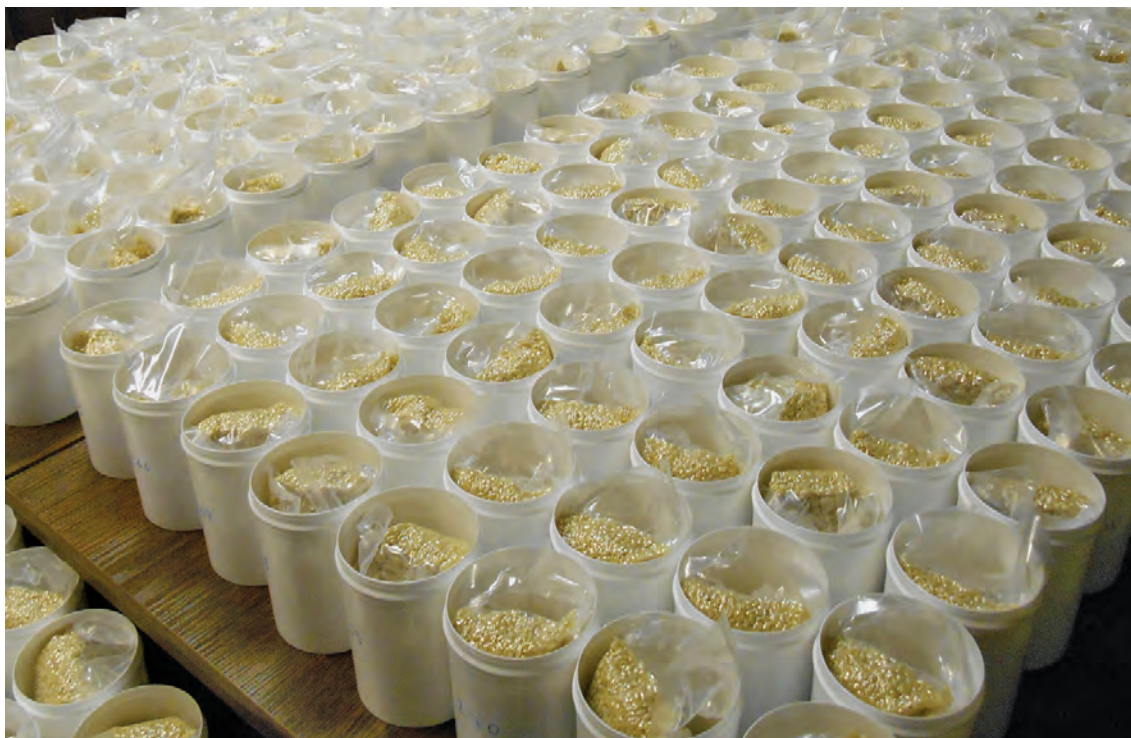
The upstream component of NUTEC Plastics builds on the Agency's efforts to deal with plastic pollution through recycling using radiation technology. In 2022, a technology readiness level (TRL) tool was developed to monitor and assess, in a consistent manner, Member States' progress in adopting radiation technology to tackle plastic pollution. In addition, an Excel-based economic assessment model was developed to assess the economic feasibility of introducing radiation technology into the national recycling process vis-à-vis conventional methods, and a guideline document was prepared on how to integrate electron beam technology in the recycling process. The guideline document, TRL tool and economic assessment tool were disseminated at an international workshop conducted at the Advanced Radiation Technology Institute, an Agency Collaborating Centre in the Republic of Korea.

In Asia and the Pacific, a regional training course was conducted in Indonesia in October on the steps required to advance along the TRL scale by developing pilot plastic waste recycling facilities that use irradiation. The training course was attended by 19 participants from 7 Member States. In addition, two national stakeholder meetings took place in Indonesia and Malaysia in October. Monthly one-to-one consultations with Indonesia, Malaysia, the Philippines and Thailand were organized to closely monitor progress and provide timely technical support. By December, the four countries had completed almost all TRL 3 requirements.

In Latin America, the first part of a regional training course on the modification of natural polymer waste using ionizing radiation was conducted virtually in September. The course covered a broad range of topics, from the fundamentals to applications, and was attended by 43 participants from 11 Member States. The hands-on part of the course was completed by 23 participants in late September in Argentina. Lastly, a regional training course on scaling up radiation technology was conducted in November in Brazil and was attended by 11 participants from 7 Member States.

In Africa, an expert mission was conducted in Ghana in May to review the national project plan with the relevant authorities and identify needs for successful involvement in NUTEC Plastics.

In the area of research, the first research coordination meeting under a coordinated research project on recycling plastic waste for structural and non-structural materials took place in April in Vienna with the participation of 18 Member States.



Preparation of individual units of certified reference material IAEA-464 (radionuclides in brown rice).

Accreditation as Reference Material Producer

In 2022, the Agency was accredited by the Austrian National Accreditation Body to produce certified reference materials (CRMs) for activity concentrations of gamma ray-emitting radionuclides in selected environmental matrices. The accreditation process was fully documented using a quality management system and assessed by external experts, who provided an independent confirmation of technical competence in CRM production and compliance with ISO 17034:2016 requirements. To date, four materials have obtained CRM status within the scope of the accreditation, namely milk powder, two marine sediments, and brown rice. This work is of the utmost importance, as national laboratories use Agency CRMs to ensure the quality of their radioactivity measurement results.

Launch of New IAEA/WHO Guideline

Novel radiopharmaceuticals are valuable tools used in the diagnosis and treatment of various diseases. For testing purposes in clinical trials, investigational radiopharmaceuticals are used. To minimize risks and ensure that the results of clinical trials are unaffected by inadequate safety, quality or efficacy arising from unsatisfactory production, investigational radiopharmaceuticals should be produced and managed using an effective quality management system and in accordance with good manufacturing practices. The new IAEA/WHO guideline on good manufacturing practices for investigational radiopharmaceutical products provides recommendations on the minimum standards that should be in place when preparing novel radiopharmaceuticals for phase I–III clinical investigations, including in relation to quality management, quality control and quality validation. It also gives detailed guidance on documentation, equipment, materials and production, among other things.

Quality Assurance for Analysis of Environmental Samples

The Agency plays a leading role in producing and distributing reference materials that are used by Member States to obtain reliable stable isotope data. In 2022, the first ever training course on enhancing the quality of stable isotope ratio analysis was organized. The course focused on the types of reference material available, selection of the most appropriate reference materials for samples in analysis, definition of isotopic scale, optimal storage conditions, data elaboration and normalization for calculating high-quality stable isotope values. As part of the training, participants were taught how to use tailor-made calculating templates that were distributed at the end of the course and that may be used by national laboratories in their routine analytical work.