

CHEMISTRY AND TECHNOLOGY OF RADIOACTIVE WASTE MANAGEMENT - THE IAEA PERSPECTIVE

V. M. Efremenkov

International Atomic Energy Agency, Wagramerstr. 5, A-1400, Vienna, Austria

Since the discovery of the phenomenon of radioactivity, more than 100 years ago, there has been a continuous increase in the use of radiation and radioactive materials in industry, agriculture, medicine and research. The nuclear power industry has reached the status of a mature technology and has become an important component of the power program in many countries. As in many other industries, nuclear power and non-power nuclear applications are associated with some waste materials production. Safe and efficient management of this waste is an important component of any activity involving use of nuclear and radioactive materials and associated technologies.

The objective of radioactive waste management, in particular waste processing, is to reduce the volume of waste and to transfer it into a stable inert form suitable for safe storage, transportation and disposal. Characteristics of radioactive waste generated in different processes and at different facilities vary greatly covering the whole range of physical forms and chemical compositions. These forms and compositions depend on materials used and operational parameters of processes. These forms and compositions also define potential hazards of waste and influence selection of particular method(s) for waste processing and disposal.

All processes of treatment and conditioning of radioactive waste into a stable form in fact are physico-chemical processes, which in most cases, change both physical forms and chemical compositions of initial wastes. To transfer waste into an appropriate form with minimal radiation exposure to operational personnel, with reasonable consumption of financial, material and other resources, the chemistry of the initial waste and the chemistry of the process itself should be well understood and maintained in defined design frames. The final waste form and its quality after treatment and conditioning should correspond to particular requirements established by the responsible authority and defined both by characteristics of the disposal option and by characteristics of hazardous components of the waste (both radioactive and non-radioactive).

Taking into account that waste processing is not a "pay back" processes, the actual cost and efficiency of waste treatment and conditioning is very important. Steadily increasing requirements for improving the quality of final waste products and safety require additional efforts to improve the efficiency of the existing processes and to find new efficient methods and techniques for waste treatment and conditioning. The paper will outline the present IAEA activities in radioactive waste management, components of the program and particular projects, the existing mechanism for information collection, analysis and distribution. The role of the IAEA as a forum for information exchange, for coordinating common efforts in waste technology development and as an international body for direct assistance of Member States will be discussed. Current IAEA projects and recent achievements in related waste management areas will be summarized and highlighted.