

From non-disposable to disposable, treatment of pyrophoric or gas forming waste forms for disposal

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ABSTRACT

In order to dispose of waste in either a deep geological disposal or in a shallower repository there are several demands that the waste and its package must fulfil, one is that it is not to react with oxygen or the waste package or backfill in the repository, i.e. concrete or grout. The waste forms that do not fulfil this particular criterion must be treated in some way to render the waste non-reactive. One of these waste are metallic uranium. Metallic uranium is not only an issue originating from the nuclear industry, as old types of fuel, it is also present in, for example, transport flasks and as samples used in schools, which all has to be disposed of sooner or later.

Another waste that arise is magnesium doped with thorium, originating from the aviation, aerospace and missile industry. These alloys are now being replaced with others without thorium so they are in need of handling and possibly treatment before disposal. Magnesium metal is also pyrophoric, in particular in molten or powder form.

In order to evaluate thermally treating these metals in a very controlled environment, such as a pyrolysis vessel, experimental work has been performed. The aim of the thermal treatment is to oxidise the metals and obtain an oxide with low leachability. Inactive trials were performed, first using small amount of magnesium tape followed by using Cerium instead of uranium, to check the ability of controlling the process. After the process had been deemed safe the next step was to test the process first with metallic uranium and thereafter with magnesium thorium alloy.

The first results show that the oxidation process can be totally controlled and safe. The results show that the metals are oxidised and no longer reactive and can in principle be disposed of. The test will continue and further results will be reported.