
**Nuclear fuel technology — Determination
of the O/M ratio in MOX pellets —
Gravimetric method**

*Technologie du combustible nucléaire — Détermination du rapport O/M
dans les pastilles MOX — Méthode gravimétrique*



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Nuclear fuel technology — Determination of the O/M ratio in MOX pellets — Gravimetric method

1 Scope

This International Standard describes a method for determining the oxygen-to-metal (O/M) ratio in mixed uranium-plutonium oxide $(\text{U,Pu})\text{O}_{2 \pm X}$ pellets.

2 Principle

The $(\text{U,Pu})\text{O}_{2 \pm X}$ sample is submitted to controlled oxidation-reduction under thermodynamic conditions designed to change the O/M ratio to a value of 2,000. The initial stoichiometric deviation, X , is determined from the sample mass difference before and after heat treatment.

3 Reactions

The principal reactions are as follows:

- a) $(\text{U,Pu})\text{O}_{2 \pm X} \pm x/2 \text{O}_2 \rightarrow (\text{U,Pu})\text{O}_{2,000}$
- b) $(\text{U,Pu})\text{O}_{2 \pm X} + x\text{H}_2 \rightarrow (\text{U,Pu})\text{O}_{2,000} + x\text{H}_2\text{O}$

4 Reagents

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and distilled or demineralized water or water of equivalent purity.

4.1 Nitric acid solution, with a volume fraction of 50 %.

4.2 Purge gas.

4.2.1 Air, with a volume fraction of 99,99 % purity grade.

4.2.2 Argon.

4.2.3 Hydrogen or hydrogen/argon mixtures, with a volume fraction of 99,99 % purity grade, to which water vapour may be added to obtain an oxygen potential (ΔG_0) approaching $-420 \text{ kJ}\cdot\text{mol}^{-1}$ ($-100 \text{ kcal}\cdot\text{mol}^{-1}$).

5 Apparatus

5.1 Muffle furnace, having provision for measuring the temperature and sweeping the hearth with various gases.