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URANIUM-TITANIUM ALLOYS

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1 Claim. (Cl. 75—122.7)

The present invention is concerned with uranium-base alloys and more particularly relates to uranium-base alloys containing titanium.

Uranium is not resistant to corrosion, therefore one object of the present invention is to so improve the physical properties of uranium and uranium-rich alloys as to enhance the corrosion resistance thereof and render the same useful for various purposes for which uranium and uranium alloys now in use are not satisfactory or efficient.

Still another object of this invention is to produce uranium-titanium alloys which are useful as fuel elements in neutronic reactors, such as disclosed in U. S. Patent No. 2,708,656 to Fermi et al.

Other objects and advantages of the present invention will be apparent from the following description, taken connection with the appended claim.

The present invention is directed to certain novel uranium-titanium alloys which have certain extremely desirable characteristics. While these uranium-titanium alloys may vary somewhat in their physical characteristics, they are ordinarily characterized by improved corrosion resistance. Generally, such desirable characteristics were observed in uranium-titanium alloys having a titanium content between about 1.0 weight per cent and 15.0 weight per cent. The following chart illustrates a typical set of results obtained by testing these new uranium-titanium alloys.

Wt. Percent Ti in alloy	Wt. loss in mg./cm.² at end of—		
	48 hours	96 hours	240 hours
0	125	225	561
2.2	20	45	
3.1	10	25	75
7.2	0	0	0
9.5	0	0	0

From these results it is readily apparent that even small amounts of titanium greatly increase the corrosion resistance of uranium.

These new uranium-titanium alloys may be conveniently prepared by melting together the required amounts of uranium and titanium in a suitable refractory crucible, for example, a beryllia crucible. The uranium and titanium metals should be melted in the absence of oxygen or moisture, as for example in vacuo or in a substantially anhydrous inert atmosphere. If desired, mixing of the metals is facilitated by inductive heating.

By means of microscopic and dilatometric studies it was found that titanium is appreciably soluble in gamma uranium. It was further found that the temperature of the beta-gamma transformation of uranium was lowered as the amount of titanium present in the alloy is increased. For example, in a uranium-titanium alloy containing 3 weight per cent titanium the temperature of the beta-gamma transformation is about 40° C. lower than that for pure uranium. It was also found that the alpha-beta transformation temperature of uranium was substantially unaffected as the amount of titanium in the alloy was increased, and that titanium is substantially insoluble in alpha uranium.

It will be apparent to those skilled in the art to which this invention pertains that various modifications may be made without departing from the principles of the invention as disclosed herein, and thus it is not intended that the invention should be limited other than by the scope of the appended claim.

What is claimed is:

A corrosion resistant binary alloy consisting of uranium and titanium with the titanium content constituting from 1 weight per cent to 15 weight per cent of the combined uranium-titanium composition.

References Cited in the file of this patent

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