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PROCESS FOR DETERMINING TITANIUM
CARBIDE IN STAINLESS STEELWalter C. Maurer, McKeesport, Pa., assignor to
Carnegie-Illinois Steel Corporation, a corpora-
tion of New JerseyNo Drawing. Application January 22, 1945,
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3 Claims. (Cl. 23—230)

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This invention relates to an improved method for the determination of titanium carbide in titanium-bearing stainless steels. The object of the invention is the provision of an improved process characterized by simplicity and accuracy.

Generally speaking, my invention comprises the steps of extracting insoluble titanium carbide from the steel, oxidizing the carbide, and determining the result colorimetrically.

The process is illustrated by the following procedure:

Prepare a sample of cuttings of the steel fine enough to pass through a twenty-mesh sieve. Weight two grams of the sample, and transfer to a 250 ml. beaker. Add 100 ml. water and 30 ml. hydrochloric acid (sp. gr. 1.18) giving an acid concentration of about 9%. Cover the beaker with a watch glass and heat to just below the boiling point until the sample is completely dissolved except for the titanium carbide, keeping the volume constant by adding water if necessary. Remove beaker from hot plate and filter contents immediately through a close texture filter paper, such as for example, an eleven cm. Whatman No. 42 filter paper, using paper pulp, and wash the filter paper about five times with hot two per cent hydrochloric acid. Titanium carbide is insoluble in hydrochloric acid of the concentration used and is, therefore, left as a residue on the filter paper. Transfer the filter paper containing the carbides to the original beaker. Add 15 ml. perchloric acid (70-72%) and 3 ml. nitric acid (sp. gr. 1.42), and boil cautiously until the paper is oxidized; and continue boiling to heavy fumes for complete oxidation of the carbides.

From this point, the titanium can be determined by any color method by diluting with water to a suitable volume, aliquoting if necessary, adding 5 ml. three per cent hydrogen peroxide, and matching the color against a standard solution of titanium perchlorate, or using a photoelectric colorimeter, of which various types are available on the market. The result is percentage of titanium. This value divided by four gives the percentage of titanium carbide.

It is found in practice that a larger sample may be taken to assure accuracy, for example, a

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five gram sample. However, it is found that a one or two gram sample checks well against a five gram sample. No separation of chromium is made in accordance with the present method, because there is usually not sufficient chromium tied up as carbide to interfere with the color method for titanium.

If the original steel is high in nitrogen, the result obtained by my method is titanium carbide plus titanium nitride.

I claim:

1. In a process of determining the titanium carbide content of titanium-bearing steel, the steps including dissolving the steel and the free titanium therein in dilute hydrochloric acid leaving the titanium carbide in the solid form, filtering the solution and collecting the undissolved residue of titanium carbide, then oxidizing the residue separately from the filtrate and determining by known procedure the amount of titanium originally present as carbide.

2. The process defined by claim 1 characterized by adding perchloric and nitric acids to the collected residue of titanium carbide to oxidize it.

3. The process defined by claim 1 characterized by dissolving the steel in hydrochloric acid of about 9% concentration.

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