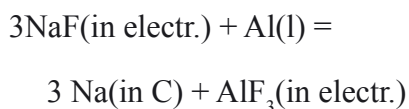


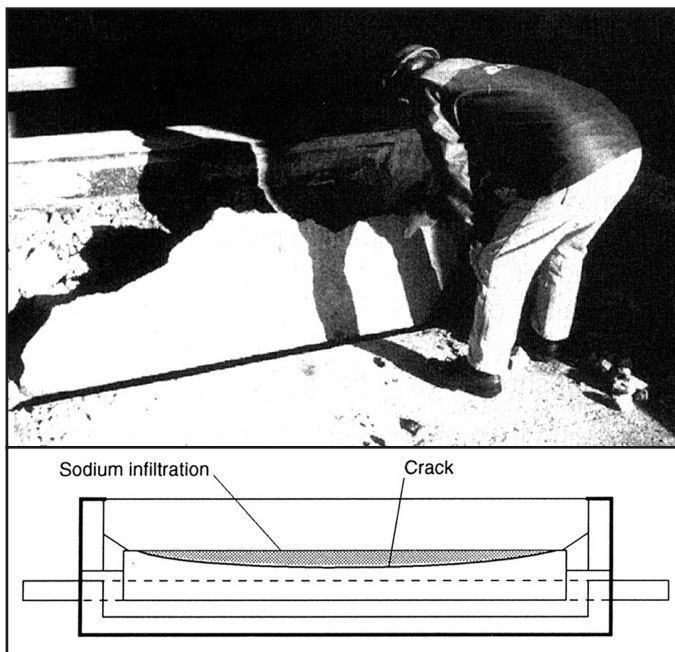
Sodium Vapour Test

Introduction

Sodium penetrates into carbon by the reaction:

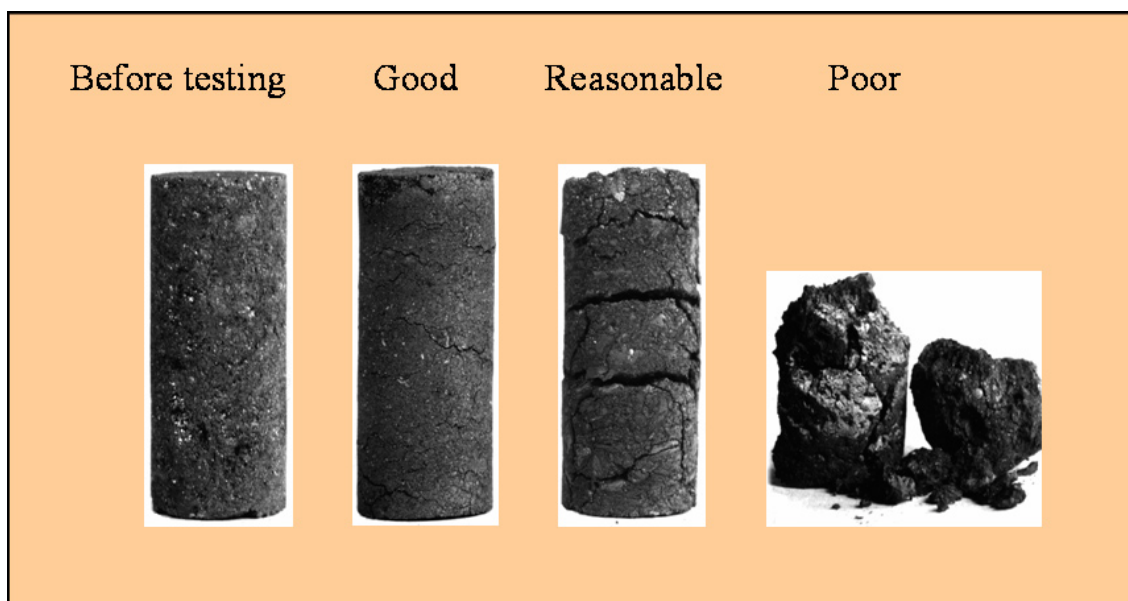


It is important that the carbon material is resistant towards this penetration. If the resistance is too low the carbon will deteriorate. The picture shows a carbon bottom that deteriorated after 1.5 days.



Test Results

The test may be performed on prebake electrode mass, Søderberg mass, electrode mass and pastes containing synthetic binders. Today's ramming pastes are usually good to reasonable. Poor quality ramming pastes as shown on the right hand in the photo below are rare. In general the sodium resistance increases with higher heat treatment temperature of the cathode material. The test is excellent in comparing different cathode materials, including quality verification between batches with equal specifications.



Experimental

The layout of the sodium vapour test is shown in the Figure below. Carbon samples are placed in a sample holder in the bottom of a container. A gold gasket is used as sealing between the two parts of the container. The closed container with the sample is evacuated and flushed with argon gas 3 times. Before the container is placed into the furnace it is filled with Ar at 100 torr to check for leakage. During heating a chemical transport reaction occur due to the different temperature in the top and bottom of the container. Sodium evaporates from the bottom and passes through and partly absorbs in the samples while the remaining sodium condenses at the top.

Typical experimental data:

Sample size:

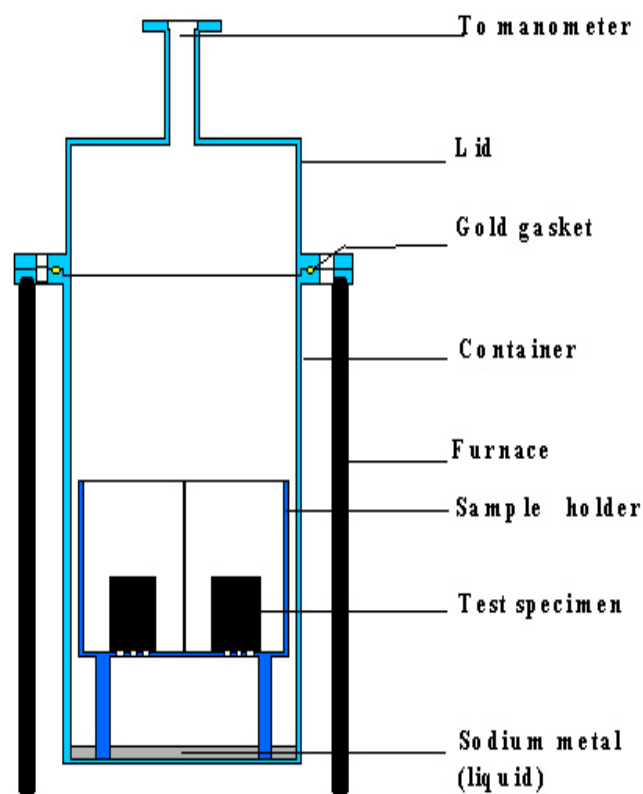
15 mmØ x 30 mm
or
50 mmØ x 50 mm

Temperature:

820 °C (max)

Start pressure:

100 torr



Reference

M. Sørli and H.A. Øye, "Deterioration of Carbon Linings in Aluminium Reduction Cells. Part II. Chemical and Physical Characterization of Cathode Carbons". Metall 38(1984)109-115.

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