INVESTIGATION OF IMPURITY DEPOSITION IN A COLD TRAP OF A SODIUM LOOP

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INTRODUCTION

The main function of a cold trap is the purification of the loop sodium in respect to oxygen, but several other compounds or elements are deposited there, too.

To gain more informations upon these purification effects of a cold trap in an inactive sodium loop, the sodium at the coolest region of the cold trap of the test circuit KP 1 was analyzed. The cold trap was operated during 8150 hours at 120 and 145 °C, respectively. A scheme of this cold trap is shown in Fig. 1.

![Fig. 1 Scheme of the cold trap KP 1](image)

It consists of an outer tube closed on the bottom having a length of 100 cm and a diameter of 16 cm, and an inner tube filled with wire mesh. The sodium enters into the gap between the outer and the inner tube passing the lower end of the cold trap with the lowest temperature. There, the direction of the sodium flow is changed, the sodium is passing through the inner tube and returning into the loop.
EXPERIMENTAL PROCEDURE AND RESULTS

In a glove box the cold trap was cut in the region of the lowest operating temperature as shown in Fig. 2.

![Fig. 2 Sectional drawing of the cold trap](image)

Cutting through the diameter a cavity was observed below the lower end of the inner tube, probably formed during cooling to room temperature causing a solidification of the sodium. Samples were taken from different places of both sides of the cutting plane characterized by letters and numbers in the diagram.

The remaining sodium from the bottom was used for particle analysis.

In Table 1 the results of estimations of carbon, present in different chemical states (2), are shown.

<table>
<thead>
<tr>
<th>ppm C</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbide</td>
<td>23</td>
<td>2</td>
<td>19</td>
<td>3</td>
<td>130</td>
<td>2</td>
</tr>
<tr>
<td>Carbonate</td>
<td>0.5</td>
<td>0.5</td>
<td>2</td>
<td>0.5</td>
<td>33</td>
<td>4</td>
</tr>
<tr>
<td>Cyanide</td>
<td>6</td>
<td>0.5</td>
<td>3</td>
<td>0.5</td>
<td>2/40</td>
<td>2</td>
</tr>
<tr>
<td>elemental + acid-unsoluble carbides</td>
<td>255</td>
<td>46</td>
<td>709</td>
<td>75</td>
<td>50</td>
<td>65</td>
</tr>
</tbody>
</table>

In the first line the values of carbon contents present as water-soluble carbide are noticed. In the gap between the outer and the inner tube (position A) the content is about 20 ppm, below the filter of the inner tube (position B) the content is about one