

**Object: Outgassing measurements of Torrseal vacuum resin**

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In this note we briefly report the results obtained on Torrseal vacuum resin in view of its possible use as glue for the magnets needed in various parts of Virgo. The test apparatus is described in detail in the note VACPISA 025. The outgassing is measured using the dynamic method: measuring both pressures in the sample chamber  $P_1$  and in the pumping chamber  $P_2$  the total outgassing flow can be deduced from the relation:

$$Q = (P_1 - P_2) \times C \quad (1)$$

where  $C$  is the conductance (20 l/s  $N_2$  equivalent at 20°C). The measurement is performed twice, with and without the sample into the sample chamber: the difference between the two flow values will represent the net sample outgassing; the difference in the RGA spectra will give the mass distribution of the sample outgassing.

## 1 - System performances

After baking the base pressure of the chamber is of the order of  $10^{-9}$  mbar and the outgassing rate of the order of  $10^{-11}$  mbar l s<sup>-1</sup> cm<sup>-2</sup>. The main components of outgassing are  $H_2$ ,  $H_2O$ ,  $N_2/CO$ ,  $CO_2$ .

## 2 - Measurement of the outgassing flow of Torrseal

The Torrseal vacuum resin is manufactured by Varian with a maximum operating temperature of 120°C. The Torrseal has been put on a clean thin metal slab and cured for a short time in air at room temperature. The surface exposed to vacuum was 100 cm<sup>2</sup>.

We monitored the outgassing evolution:

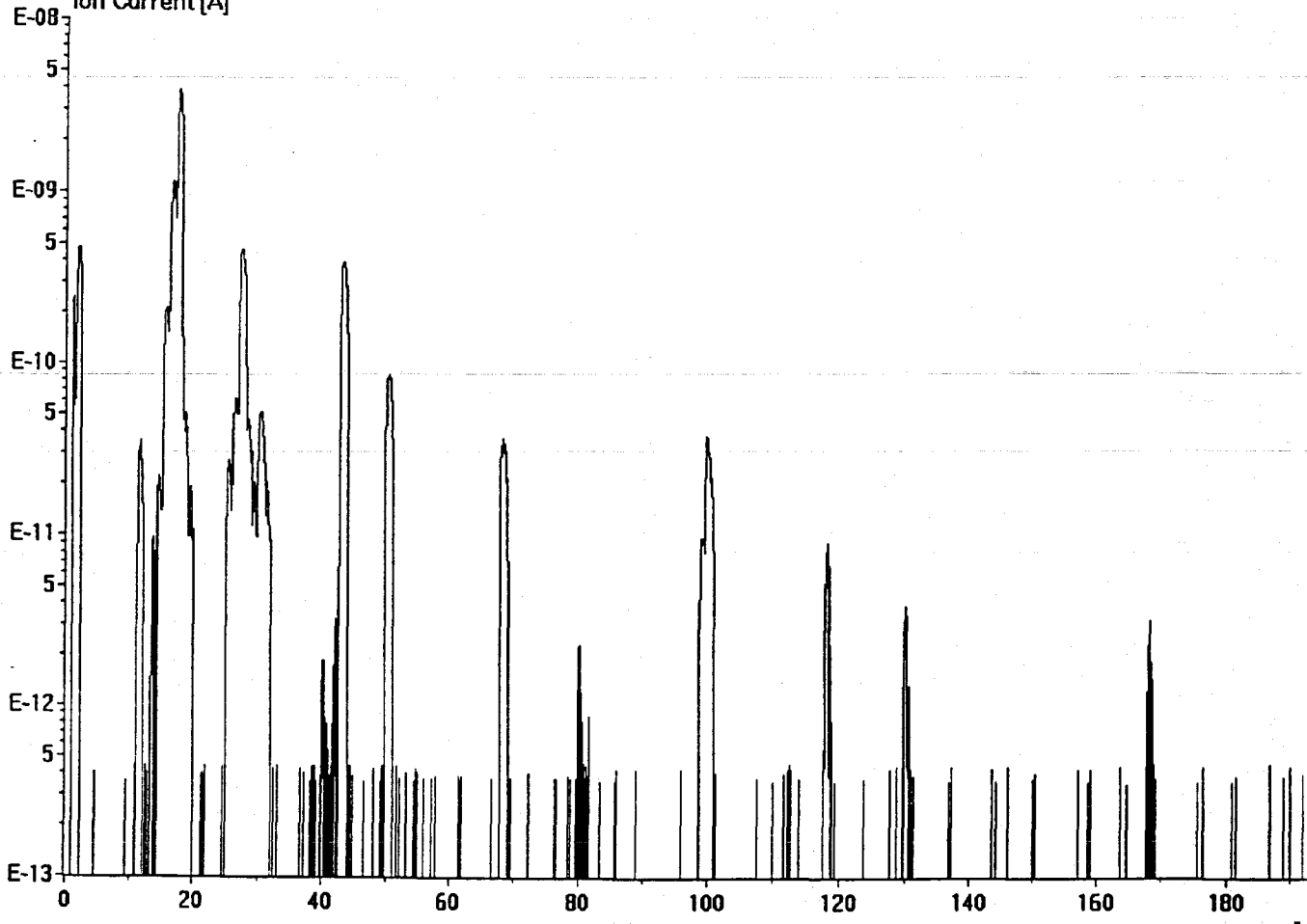
| t(h) | T(°C) | p <sub>1</sub> (mbar) | p <sub>2</sub> (mbar) | Q(mbar l/s)          |
|------|-------|-----------------------|-----------------------|----------------------|
| 1    | 19    | 3.7x10 <sup>-5</sup>  | 2.9x10 <sup>-5</sup>  | 1.6x10 <sup>-4</sup> |
| 49   | 19    | 4.2x10 <sup>-6</sup>  | 3.0x10 <sup>-6</sup>  | 2.4x10 <sup>-5</sup> |
| 78   | 19    | 4.8x10 <sup>-6</sup>  | 2.9x10 <sup>-6</sup>  | 3.8x10 <sup>-5</sup> |
| 145  | 19    | 1.0x10 <sup>-6</sup>  | 9.2x10 <sup>-8</sup>  | 1.8x10 <sup>-5</sup> |

The outgassing spectra taken after 1h and 145h are shown in Fig. 1, 2. It is evident that there is a contamination from high mass compounds. The outgassing rate evolution is summarized in Fig. 3. Due to the presence of these compounds, we did not perform baking in vacuum.

### 3 - Discussion

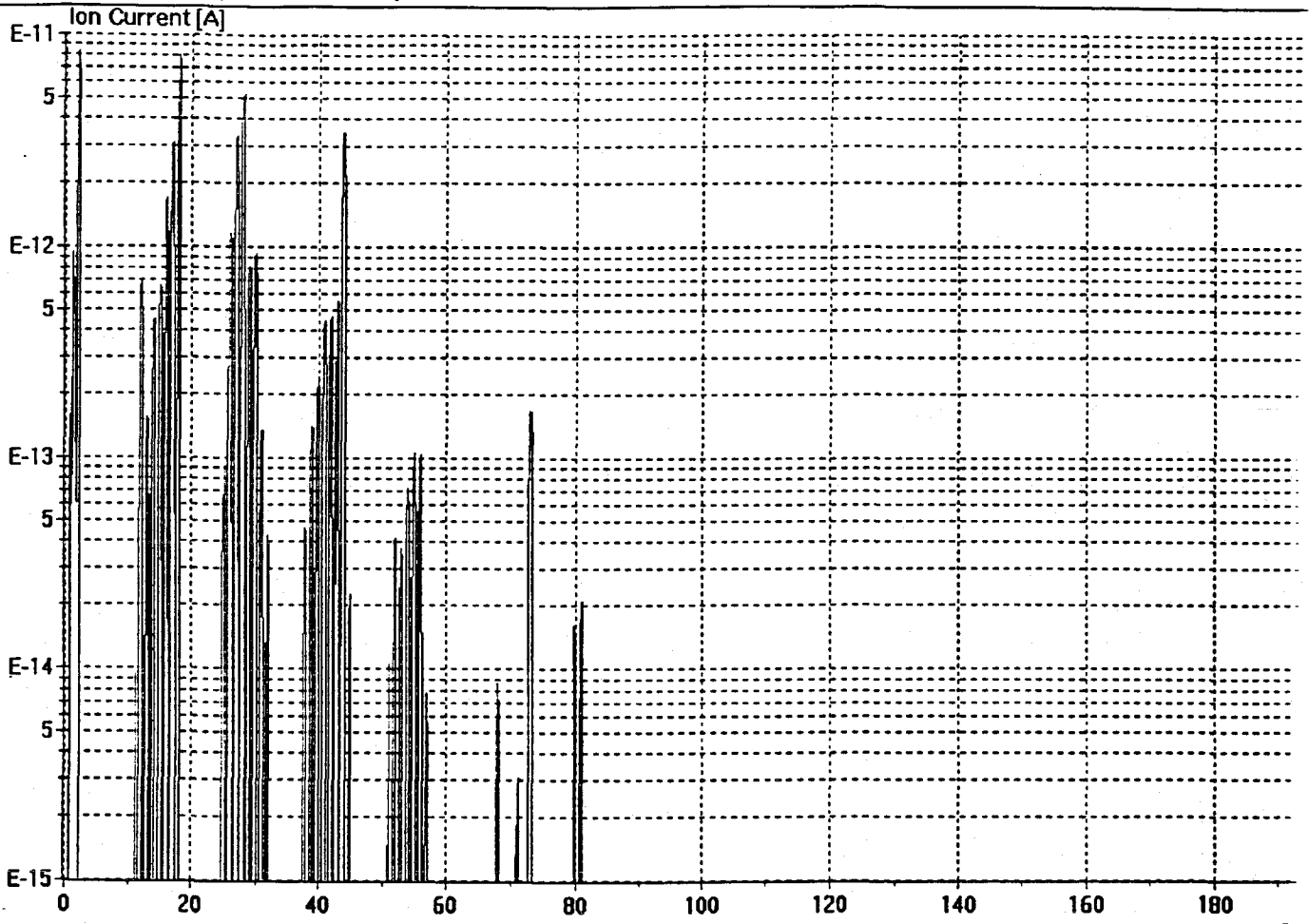
After 1 week of pumping the outgassing rate of Torrseal was of the order of 10<sup>-7</sup> mbar l s<sup>-1</sup> cm<sup>-2</sup>, comparable with the factory predictions. On the other hand, we found disagreement about the outgassing composition, since the factory does not mention the higher mass contamination. We do not recommend Torrseal with room temperature curing for use in Virgo. We intend to perform an additional test by first curing the Torrseal in air at high temperature (120°C).

Ion Current [A]



Torrseal

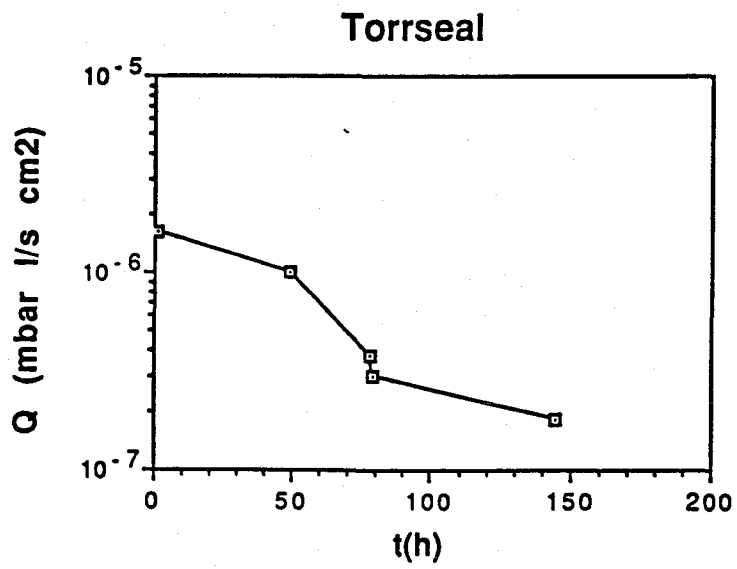
Fig. 1



Display Values in progress X: 58.69 Y: 8.248951E-12

Torr seal

Fig. 2



*Fig. 3*

