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CHEMISTRY RESEARCH DEPARTMENT

Research Laboratory

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GASSY NICKEL CLAD Ba GETTER

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Abstract: Relatively large amounts of gas are produced from a nickel clad Ba getter while being heated before flashing, hence the degassing of getters is a necessary step. After the getter is flashed, CH_4 and N_2 are produced. These are gases which are adsorbed slowly and with low efficiency by the getter, and may even sometimes remain in the device the getters are intended to keep at low pressure.

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While the normal function of getters is to remove the vestiges of gases left by the pumps in vacuum devices, the preliminary heating before they are flashed, usually results in an evaluation of gas by the getter itself. If the amount of this gas is large, and it exceeds the capacity of the getter, it must be removed by pumping. This usually is done by heating the getter below its flashing temperature while the device is still attached to the pumps. After this preliminary heating, it is sealed off from the pumps, and the getter flashed. Gas may also be evolved at this time, and may tax the capacity of the deposited active metal film.

A study of the gases evolved at various temperatures by a getter such as is used in a television picture tube has been made to find how important these gases may be, and to indicate the best method in dealing with them. It was found that the amount of gas evolved was considerable, that gas was evolved slowly beginning at relatively low temperatures and at an increasing rate up to the temperature at which the getter started to deposit. When the first traces of deposit were noticed, the composition of the gas changed and the total rate of evolution decreased markedly. As evaporation proceeded, gas continued to be evolved until the getter burned through. The gases present during the evaporation of the getter, nitrogen and methane, are those least effectively adsorbed by the getter. Perhaps the other gases are also being evolved by the heated material, but are being adsorbed immediately on the freshly deposited active film.

At fixed temperatures below that required to evaporate the getter, the rate of ~~evaluation~~ evolution of gases decreased with time, presumably as the supply was depleted. By heating at the proper temperature for a period long enough to remove virtually all the gas contained by the getter, the effective capacity of the getter might be increased but the time required for such treatment would

be excessive.

A nickel clad ~~barrier~~ barium getter was mounted centrally in a 500 cc pyrex bulb, and the bulb attached to the sample inlet tube of a mass spectrometer. An electrical connection was provided to heat the getter by passing a current through it. A Variac connected to a 4-volt transformer provides an adjustable power source. Mass spectra were run at settings of the variac which were progressively higher; the data are interpreted in Fig. 1, which shows the rates of evolution of various gases as a function of time. Since the temperature is increased stepwise, they also indicate the rate of evolution as a function of temperature. The vertical scale corresponds to peak heights, but is not directly proportional to rates; increasing H_2O and CH_4 by a factor of 2 and N_2 by a factor of 5 would improve the approximation, and at least indicate roughly the relative amounts of each. Hydrogen, not shown, ran about parallel to "other hydrocarbons," and at half the rate, the verticle scale is in micron liters per hour; but is intended to indicate the order of magnitude only. The total amount of gas evolved was 15 to 30 micron liters. It should be recalled that what actually was measured was the rate at which each of the various gases was pumped out of the bulb containing the getter. The gases evolved by the getter, and adsorbed on the walls are not included. The gases observed here are about what would be expected, both in composition and amount, from untreated nickel tubing. Perhaps pretreatment by vacuum degassing during manufacture of the getters, or before use, would decrease the gases evolved on heating.

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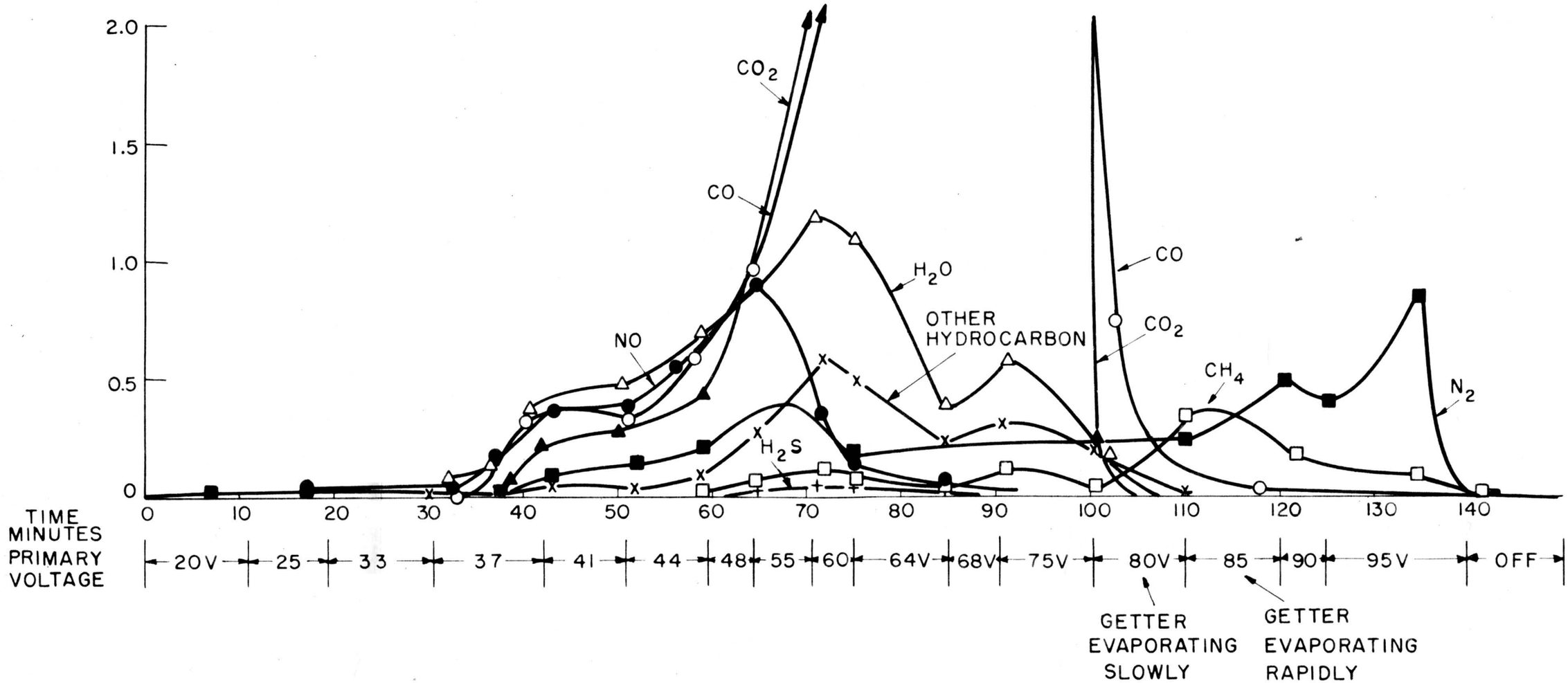
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CO
H_2O
OTHER HYDROCARBON
NO
H_2S
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CO_2
CH_4
N_2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
TIME MINUTES
PRIMARY VOLTAGE
20V
25
33
37
41
44
48
55
60
64V
68V
75V
80V
85
90
95V
OFF
GETTER EVAPORATING SLOWLY
GETTER EVAPORATING RAPIDLY

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