crater at 1 atmosphere pressure. This value is due to Benedict [*Ann. Physik*, **49**, 144 (1916)]. The method used by her has been adversely criticized by others and a careful search of the literature shows that this temperature may be 200° too high.

The following values are the heats of reaction for the two processes involved:

$$C_{solid} \longrightarrow C_{monatomic\ vapor} \qquad \Delta H = 177 \text{ k. cals.} \qquad (1)$$

$$C_2 \longrightarrow 2C \qquad \Delta H = 150 \text{ k. cals.} \qquad (2)$$

The rate of loss in weight in g./sq. cm./sec. as a function of temperature is given by the formula

$$\log m = -\frac{177{,}000}{4.58T} + 2 \log T + \left(\frac{F^\circ - E_0^\circ}{4.58T}\right)_{graphite} + 3.174 \qquad (3)$$

This equation applies only to the carbon evaporating to form monatomic vapor. In the temperature range 2300–2800°K. this is 92–96% of the total carbon evaporating. The vapor pressure can be calculated from the rate of loss in weight by the equation

$$\log p = \log m + 1/2 \log T - 2.187 \qquad (4)$$

where p is expressed in atmospheres. The equation for the variation of the equilibrium constant of reaction (2) as a function of temperature is

$$\log \frac{(P_c)^2}{(P_{c_2})} = -\frac{150{,}000}{4.58T} + 3/2 \log T + \log (1 - e^{-2340/T}) + 1.462 \qquad (5)$$

When this equation is applied to the results of Kohn and Gückel the following values are calculated for the partial pressures of monatomic carbon vapor

T, °K.	Total pressure	P_c (atm.)	P_c (extrap.)
4200	1	0.21	0.17
4705	5	1.23	1.50

The fourth column gives the values extrapolated by equations (3) and (4) from the results in the temperature range 2350–2800°K. In making the extrapolation it was assumed that the latent heat of fusion of graphite was 8000 cal.

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A SIMPLE TEST FOR STREAMING IN THE POROUS DIAPHRAGM DIFFUSION CELL

Sir:

The diffusion cell of Northrop and Anson [*J. Gen. Physiol.*, **12**, 543 1929)] as further standardized by McBain and Liu [THIS JOURNAL, **53**, 59 (1931); see also M. E. Laing McBain, THIS JOURNAL, in press (1933)]

is now widely used in this country and abroad as a highly convenient and accurate method. These authors eliminated bulk streaming of liquid through the sintered glass or other porous membrane by careful leveling of the membrane which separates the denser liquid above from the lighter liquid beneath. Several workers have obtained erratic results when using membranes that were too coarse.

We find that it is simplest to test all cells for streaming by using them once tilted at an angle such as 30°. If the pores are too coarse, the values for diffusion may be increased as much as four-fold as compared with either the same cell used horizontally or with a cell of fine pores. Such cells should be discarded because those with finer pores such as glass sintered membranes "G3" ($2\text{–}5 \times 10^4$ Å) are scarcely affected by tilting.

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THE RADIOACTIVITY OF LANTHANUM, NEODYMIUM AND SAMARIUM

Sir:

In view of the note in *Nature* [**130,** 846 (1932)] by Hevesy and Pahl regarding the radioactivity of samarium, we wish to report an independent investigation on this subject. In October of this year we discovered radioactivity in a sample of samarium and since that date we have examined samples of lanthanum and neodymium which are also radioactive.

The method employs the Geiger–Müller counter set-up as described by Libby [*Phys. Rev.*, **42,** 440 (1932)]. The salts investigated have been deposited as a thin film on the inside of a glass tube. This is placed around the counter which is in the form of a long wire enclosed in a metal screen cylinder. In a typical run 20 g. of potassium chloride deposited on the tube increased the zero count of 15 per minute to 160.

The activities of the samples of lanthanum and neodymium are not appreciably screened by 0.07 mm. of aluminum, whereas that of samarium is very largely, if not completely, screened, indicating that the activities of the former are mainly of the beta type and that of the latter alpha. We have used two different samples of neodymium, one sulfate and the other oxalate. Both show an activity which is approximately 2.5 times that of potassium per mole. The lanthanum activity per mole is about 8 times that of potassium and the samarium approximately 3 times. A careful examination of a very pure sample of gadolinium sulfate prepared by Professor B. S. Hopkins gave results which are negative to at least 2% per mole of the activity of potassium.

We believe that the radioactivity of these elements is due to the