tial alkaline metal reserve is then required. Accordingly, the curve n_e (θ) is modified by reducing the diameter of the neck 7, in order to produce curves for n_a and n_e which are substantially coincidental between 45° and 77° C.

In this way, a cell is obtained which produces an optimum signal in a continuous fashion, throughout the whole temperature range between 45° and 77° C.

The manner in which the cell in accordance with the invention starts operating, is easily explained. At ambient temperature, the envelope will tend to empty itself of vapor. When the envelope is brought to the predetermined operating temperature, there is initially a low number n of atoms in the envelope. However, the absorption factor of the paraffin is proportional to the number of atoms present in the envelope:

$$n_a = \lambda n$$

where λ is a constant.

n_a is therefore low at the start and n_e is much higher because of the pressure difference between the bulb and the envelope. Accordingly, the envelope starts to fill up. As filling progresses, n_a rises and n_e reduces, until an equilibrium ($n_a = n_e$) is reached, where the number of atoms in the envelope remains the same and this condition maintains in the envelope the desired optimum vapor pressure.

In one embodiment, operation at 70° C was made possible using a 3/100 mm diameter for the neck 7.

Similar results can also be obtained with cells containing a filler gas, the glass walls of which do not carry any paraffin layer. In cells of this kind, the alkaline substance reacts chemically with the glass and the walls of the envelope therefore absorb a certain number of atoms and play the same part as the paraffin layer in the example hereinbefore described. On the other hand, there is then no point in decelerating the gas flow between the wall of the envelope and the alkaline reservoir, using a small-diameter orifice or neck.

The filler gas is by itself adequate to produce the desired decelerating effect, due to the diffusion of the alkaline vapor through the gas. In order to regulate the temperature of operation and achieve the desired equilibrium condition, all that is necessary is to vary the length and width of the neck 7 connecting the bulb 4 with the envelope 1, the gas flow being highly sensitive to these parameters.

The cells according to the invention have, among others, further advantages:

A higher operating temperature than known cells, although the optimum vapor pressure is nevertheless maintained within the envelope.

This means there is a facility for control of the cell temperature, without having to resort to excessive power consumption.

A lower degree of necessary precision in said control, since the optimum vapor pressure can be achieved in the envelope not merely for a single temperature but throughout a continuous range of temperature.

Operation at a high temperature without any necessity for heating up one part of the cell more than any other, as was required in the case of cells using a compound of carbon and alkaline metal, thus meaning improved stability in devices employing the cell in accordance with the present invention.

Of course, the invention is in no way limited to the examples described hereinbefore. In particular, the alkaline metal used need not necessarily be rubidium.

In addition, it goes without saying that the arrangement for decelerating the gas flow between the bulb 4 and the envelope 1 is not necessarily a small-diameter orifice or neck (in the case of envelope lined with an absorbent layer), and other arrangements having the same function, may be placed at 7, for example a porous wall or a capillary tube, may be used, the gas flow then depending not only upon the diameter of the capillary tube but also upon its length.

I claim:

1. An optical resonance cell adapted to substantially maintain an optimum alkali metal vapor pressure therein over a range of temperatures, said cell comprising;
   an envelope having transparent walls,
   a reservoir containing an alkali metal and connected to said envelope for supplying vaporized alkali atoms thereto,
   first means disposed between said reservoir and said envelope for limiting said supply of alkali atoms to a first rate which is a first predetermined function of temperature, and
   second means within said envelope for absorbing said vaporized alkali atoms from said envelope at a second rate which is a second predetermined function of temperature,
   said first and second means being constructed relative to each other and cooperating with each other to cause said first and second functions of temperature to be substantially matched over a range of temperature thereby resulting in a dynamic equilibrium of vaporized alkali atoms at substantially said optimum vapor pressure over said range of temperature,
   said first means cooperating with said second means for preventing the absorbing means from losing its absorbing efficiency and for decelerating said atoms supplied from said reservoir to obtain within the envelope the desired atomic density.

2. A cell as claimed in claim 1, wherein said second means comprise a paraffin layer deposited on said walls inside said envelope.

3. A cell as claimed in claim 2, wherein said first means comprise a small-diameter orifice of predetermined diameter between said bulb and said envelope.

4. A cell as claimed in claim 2, wherein said first means comprise a capillary tube of predetermined diameter and length between said bulb and said envelope.

5. A cell as claimed in claim 2, wherein said first means comprise a porous wall of predetermined porosity and thickness between said bulb and said envelope.

6. A cell as claimed in claim 1, wherein said second means comprise a filler gas at a predetermined pressure inside said envelope.

7. A cell as claimed in claim 6, wherein said second means consist of the glass of said walls, and said first means further comprise a neck of predetermined diameter and length between said bulb and said envelope.

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