FOLIATE ION SELECTIVE ELECTRODE

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Foliate ion is also a constituent of Vitamin B-complex. An ion selective electrode sensitive to this ion has been prepared and tested.

EXPERIMENTAL

Folic acid was dissolved in normal ammonium carbonate solution till almost saturation. Mercuric foliate was prepared, separated, washed, and silicone grease electrode was prepared by a method very similar to the para-amino benzoate electrode(PABA)[1]. Measurements were also similar to that with PABA electrode.

RESULTS AND DISCUSSION

It is evident from Table 1, that the silicone grease based electrode is slightly more accurate as it has marginally lower value of standard deviation than PABA electrode.

The potential of the electrode vs log concentration of foliate ion in the range of log [foliate] = -2 to -4 satisfies the emperical relationship $E = 0.366 + 0.01 \log [\text{foliate}]$ at 25°C. Using 15 unknown samples, the average error in determining the concentration has been found to be of the order of 1%.

Addition of oxalate, acetate, citrate, tartrate, succinate, benzoate, chloride and sulphate ion in small concentrations to the foliate ion solution has been found not to affect the potential of the electrode indicating the electrode to be highly specific.

The electrode potential vs log [foliate] has been examined and found to be linear in various media as given by the following equn.

TABLE 1

COMPARISON OF PERFORMANCE OF DIFFERENT FOLIATE ION SENSITIVE ELECTRODES

Electrode characteristics	Silicone grease based electrodes	Pellet based electrode
S.D. m volts	0.78	9.1
Response time	2 minutes	4 minutes
Durability	1 month	1 month

$E = 0.359 + 0.009 \log [\text{foliate}]$.. 25% alcohol
$E = 0.361 + 0.012 \log [\text{foliate}]$.. 50% alcohol
$E = 0.356 + 0.013 \log [\text{foliate}]$.. 75% alcohol
$E = 0.345 + 0.011 \log [\text{foliate}]$..100% water

$E = 0.351+0.0075 \log [\text{foliate}]$ in aqueous pH 8
$E = 0.349+0.0085 \log [\text{foliate}]$ .. pH 9
$E = 0.351+0.008 \log [\text{foliate}]$ .. pH 10
$E = 0.345+0.006 \log [\text{foliate}]$ .. pH 11
$E = 0.341+0.0025 \log [\text{foliate}]$ .. pH 12
$E = 0.360+0.0065 \log [\text{foliate}]$ .. pH 13
$E = 0.366+0.006 \log [\text{foliate}]$ .. pH 14

TABLE 2

EFFECT OF TEMPERATURE-ELECTRODE BY SILICONE GREASE METHOD

Sl. No.	Medium of foliate ion	dE/dT (mv/degree)
1.	100% water	+ 1.6
2.	25% alcohol	+ 1.4
3.	50% alcohol	+ 1.1
4.	75% alcohol	+ 1.1
5.	100% alcohol	+ 0.9
6.	8 pH	+ 1.5
7.	9 pH	+ 1.7
8.	10 pH	+ 1.0
9.	11 pH	+ 1.3
10.	12 pH	+ 1.0
11.	13 pH	+ 1.5
12.	14 pH	+ 1.2

The temperature effect on the electrode potential in the temperature range 283 to 298°K in all the buffers has been found to be of the order of a few mV/degree (Table 2).

It is evident therefore that the electrode is suitable for foliate ion concentration determination is aqueous, alcoholic and in buffered alkaline media. The electrode is highly specific and the temperature coefficient of the electrode potential is quite small.

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1. Ravikant, L. Bhargava and A.K. Gurtu, *J. Electrochem. Soc. India*, 36(3) (1987) 201.

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