

NEUTRALISATION OF SPACE-CHARGE OF HOT METALS BY POSITIVE IONS OF POTASSIUM

In previous experiments¹ it was observed that high velocity positive ions of mercury did not have any effect on the Space-Charge of a hot filament and thus no change in its thermionic emission was detected when a beam of mercury positive ions was fired on it. The negative results in these experiments were probably due to the low intensity of the Mercury positive ion beam used.

In the present work investigations have been carried out with slow Potassium positive ions of much greater intensity. The apparatus consisted of a thin Tungsten filament surrounded by a Nickel cylinder which served to collect the thermionic electrons from it. The

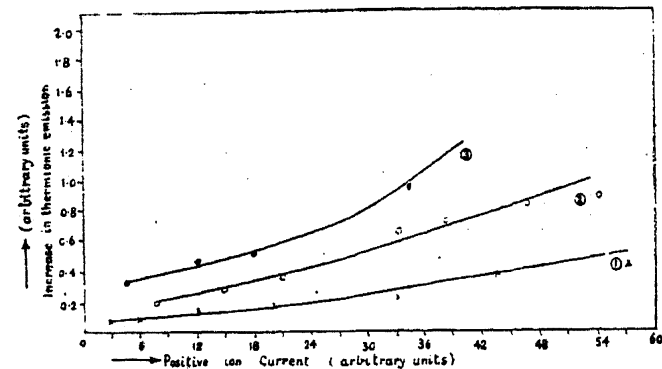


FIG. 1

Filament heating current = 4.4 (arbitrary units)

Anode Voltage = 10.0 volts

Positive ion accelerating voltage:—

Curve 1, 8.0 volts.

Curve 2, 4.0 volts.

Curve 3, 2.0 volts.

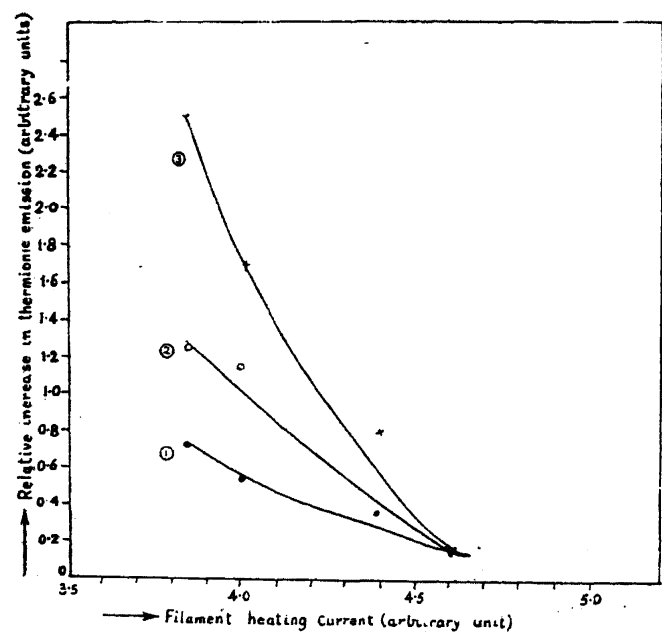


FIG. 2

Positive ion current = 42.0 (arbitrary units)

Anode voltage = 10.0 volts

Positive ion accelerating voltage:—

Curve 1, 8.0 volts.

Curve 2, 4.0 volts.

Curve 3, 2.0 volts.

filament was heated by the secondary of a low tension transformer. A very fine hole was made in the cylinder opposite the filament and a plate was placed outside the cylinder to collect the electrons issuing out of the fine hole. This electron current was measured with a galvanometer of the sensitivity of 10^{-10} amps./mm. The thermionic current to the cylinder was measured with a milliammeter. A beam of positive ions of Potassium was fired on the filament and the variations in the electron current to the plate was observed in the galvanometer for varying intensity of the beam of positive ions of different velocities. The observations were taken at different temperatures of the filament. The results shown in Figs. (1) and (2) are typical of a large number of curves obtained.

The curves in Fig. 1 show that:—

(1) The thermionic emission from the filament at a particular temperature rises almost linearly with the intensity of the positive ion beam incident on the filament.

(2) The increase in the thermionic emission at a particular temperature of the filament is less with ions of greater velocities for the same intensity of the beam.

The curves in Fig. 2 show that:—

(3) For a particular intensity and velocity of positive ions the relative increase in the thermionic emission falls off with increasing temperature of the filament.

The temperature of the filament in these experiments was always below that at which saturation current would be obtained with the anode potential used here, *viz.*, 10 volts.

Details of the experiments will be published elsewhere.

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May, 2, 1945.

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1. Chaudhri, R. M., Nawaz, S. M., and Aslam, M., *Proceedings, National Institute of Sciences of India*, 1939, 5, 3, 359.

ON A SPECIES OF SCHISTOSOMA RECORDED FOR THE FIRST TIME FROM THE ELEPHANT

IN the course of examination of helminths from a cow-elephant which died recently in the 'Topslip' area of the Coimbatore District, the author was fortunate to meet with *Schistosomes* from the liver. Since there is no record of *Schistosomes* in the elephant either in India or elsewhere in the world, as far as known, opportunity is taken to place this on record.

The collection consisted of about a hundred worms inclusive of males and females and in a bad state of preservation as they were all picked up, dead. Attempts at a morphological study indicate that the specimen differs from all known species of the genus. Though a correct identity of the worm together with a morphological description will form the matter for a future communication the following general features noticed are mentioned here:—

Males: Fairly large sized; suckers fleshy and well-developed; cuticle covered with coarse tubercles on the dorsal surface; edges

prominently inturned, forming a well-defined gynæcophoral canal; testes as many as fifty; arranged in a string, from behind the ventral sucker; intestinal cæca unite very near the hind end.

Females: Long and slender; uterus has a single ovum, shaped a longish oval with a short, abrupt, spine at one end and covered with longitudinal ridges or rugæ on the shell. Intestinal cæca have a very zigzag course, unite more than twice and end in a short common cæcum.

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THE "BELLIER FIGURE" AS AN ANALYTICAL CONSTANT OF VEGETABLE OILS AND ITS USE IN DETECTING ADULTERATION IN THEM

BELLIER'S qualitative test for arachis oil in olive oil and its modification by Franz and Adler making the test quantitative by determining the temperature at which a turbidity is first produced are quoted by Evers.¹ This test has been adopted by H. Hawley² in this laboratory for detecting and estimating the amount of arachis oil in sesame (gingelly, til) oil which is very commonly adulterated, and has been extended to some other common edible oils. It has proved a rapid and fairly accurate test in the analysis of a number of oils received in this laboratory under the Madras Food Adulteration Act, e.g., sesame, coconut, safflower and nigerseed oils. In fact, the turbidity temperature determined under strictly controlled conditions, as given below, is remarkably constant for a particular oil and in the writer's opinion, should rank as an analytical constant in the routine examination of oils. The writer proposes to call this the "Bellier figure".

The Bellier figure is determined as follows:— One ml. of the oil (Garratt³ states that for this determination the oil should be accurately measured or better weighed, i.e., 0.92 gm. being used. But the writer finds that there is no change in the Bellier figure even when the quantity of the oil varies by as much as 100 mg. and reproducible values can be obtained by pipetting out 1 ml.) is pipetted into a 250 ml. flat-bottomed flask and 5 ml. of 1.5 N alcoholic potash (15 ml. of 10 N potash solution made up to 100 ml. with redistilled rectified spirit of 90 per cent.) added. The mixture is heated under a reflux condenser by a tiny flame for five minutes and allowed to cool. It is then neutralized by 1.5 ml. dilute acetic acid (226 ml. glacial acetic acid of 17.3 N diluted to 500 ml. with distilled water). Lüers¹ recommends the addition of an extra three drops of glacial acetic acid in addition to the quantity prescribed by Franz and Adler.² The above dilution of glacial acetic acid ensures the necessary strength as recommended by Lüers. The resulting solution has a pH of 5.4. Fifty ml. of 70 per cent. (by volume) alcohol is then added. The strength of the alcohol must be accurately adjusted. It has a S.G. at 60°/60° F. of 0.8900. If a turbidity appears immediately, the contents are

warmed on a water-bath till it disappears. Thirty to forty ml. of the solution is then transferred to a large test-tube fitted with a two-holed rubber cork. Through one of the holes is passed a thermometer having a range of 0-50° C. reading to ½°. Through the other passes a thin glass rod bent at the bottom in the form of a circle to stir the solution. The test-tube is cooled in ice-water and stirred continuously. It is frequently taken out of the bath to avoid local supercooling and the temperature at which a distinct opalescence is formed gives the Bellier figure. The figure is checked by warming till the turbidity disappears and recooling.

The saponification and iodine values have ranges such that the values for two oils sometimes overlap. On the other hand, the Bellier figure is more specific and along with refractive index appears in most cases sufficient to judge the purity of an oil. The Bellier figures and Butyro-refractometer readings of some oils are given in Table I.

TABLE I

Oil	Bellier figure	Butyro refractometer reading at 40° C.
Sesame ..	19-20	59-60
Coconut ..	13-14	35-36
Safflower ..	15-16	64-65
Nigerseed ..	25-26	63-64
Mustard seed ..	24.5*	60.5
Mustard (Rape) ..	27.5*	59.5
Arachis ..	39-40	54-55

* Fig. for one sample of oil extracted from seeds in the laboratory.

Table II gives the Bellier figure of the common edible oils when genuine and when mixed with various percentages of arachis oil given in column A.

TABLE II

A	B				
Percentage of arachis oil by weight	Turbidity temperature (Bellier figure) of the oil mixture containing the percentage of arachis oil shown in col. A and the oil mentioned below to make up the balance.				
	Gingelly	Coconut	Safflower	Niger seed	Mustard seed
..	19-20	13-14	15-16	25-26	24-0
10	23-25	19.0	23.0	29.0	28.0
20	27.0	25.0	27.0	31.5	31.0
30	30.0	28.5	30.5	33.5	31.5
40	32.0	32.5	32.5	34.0	33.0
50	34.0	33.0	34.5	34.5	34.0
60	36.0	34.5	36.0	35.0	35.5
70	37.0	36.0	37.5	37.0	37.0
80	38.5	37.0	39.0	38.5	38.0
90	39.5	38.0	39.5	39.0	39.0
100	40.0	40.0	40.0	40.0	40.0