

reactive component, when phase changes are introduced between the X and Y components of the variables. But our studies reveal that even if pure resistance are used in the anode and grid circuits, closed dynamic curves can be obtained, if the grid resistance is higher than certain maximum values. Under these conditions when the grid charge leaks away but slowly, the response of the plate voltage can be delayed, developing a sort of hysteresis effect as shown in Figs. 1, 2 for the 6 C 5 R.C.A. detector, amplifier and 3, 4, for the 6 K 7 super control amplifier pentode. Curves 1 and 3 are taken with correct grid resistors, while with 2 and 4, the grid was imperfectly earthed and may be described almost floating.

Again the negative slope of the screen grid valve characteristics when the screen voltage is higher than the plate voltage, has the effect of reversing the closed curves, as illustrated in Figs. 5 and 6, which were taken with the tetrode 46.

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### COLORIMETRIC ESTIMATION OF IRON WITH RESACETOPHENONE— OXIME

SNELL<sup>1</sup> describes sixteen reagents for the colorimetric estimation of iron and of these a dozen are organic compounds. Since then several other organic reagents have been added to the list. Recently Howe and Mellon<sup>2</sup> investigated the iron-salicylaldehyde colour reaction spectrophotometrically and found that pH was a critical factor and, with solutions buffered with ammonium acetate, the colour obeys Beer's Law over a wide concentration range of iron.

Astin and Riley<sup>3</sup> drew attention to the expensiveness of salicylaldehyde as a reagent and in their investigations on the determination of copper, to cut down the cost, they adopted a procedure involving the production of the oxime *in situ* so that isolation became unnecessary. It must, however, be pointed out that salicylaldehyde itself is an expensive item. Further, Howe and Mellon (*loc. cit.*) found that dilute aqueous alcoholic solutions of this oxime (0.1 per cent.) were not quite stable. This adds to the cost of the reagent.

The present authors found that resacetophenone-oxime also gives a similar purple colour with ferric iron and the sensitivity was comparable with that of salicylaldehyde. Resacetophenone is neither costly nor difficult to prepare being obtained in very good yield from resorcinol, glacial acetic acid and anhydrous zinc chloride. This compound has also been introduced as a reagent for the detection of iron by Cooper.<sup>4</sup> The oxime (colourless crystals, m.p. 198-200° d.) is obtained easily by the usual method and is cheaper than salicylaldehyde. Resacetophenone-oxime is readily soluble in alcohol and is not precipitated by

large dilution with water. Aqueous alcoholic solutions (0.5 per cent.) are quite stable for long periods. Control of pH is necessary with this reagent also. Buffering with ammonium acetate was found to give satisfactory results. Experiments carried out with Klett's colorimeter and artificial illumination showed that the limits for the balancing method, with a final dilution of 25 ml. after developing colour, was 2.0 to 0.1 mg. of iron. Because of the powerful illumination, at the still lower concentrations of iron, the colour shades were too light for satisfactory matching.

The colour characteristics and the applicability of Beer's law could not be studied spectro-photometrically at present. This investigation will be taken up and the results published later on.

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### THE NUTRITIVE VALUE OF MILK AND CURDS

THE status of milk as the only food for infants carries with it the implication that it contains all the essential nutrients. Even for children, adolescents and adults, milk is almost an essential article of diet. An enormous amount of work has been done in Western countries to ensure the production and distribution of milk under hygienic conditions. Pasteurization is the process of choice for rendering the milk free of micro-organisms and at the same time retaining most of its nutritive value.<sup>1</sup> In India the conditions, however, do not permit strict control of the distribution of milk and as an alternative measure of safety every housewife boils the milk before it is used. This process causes destruction of some of the essential nutrients, such as vitamin A, C and carotene.<sup>2</sup> Unlike the Western countries the curds prepared by fermenting milk, forms an important constituent of most Indian dietaries. Yet the nutritive value of curds has formed the subject of few investigations. The studies in the bacteriology of milk have been undertaken to find out mainly the ways and means to prevent the growth of pathogenic organisms such as *Mycobacterium tuberculosis* and the organisms belonging to the enteric group.

According to Supplee,<sup>3</sup> the whey from the rennet curds is a rich source of vitamin B complex. It also contains, provitamins D and K in addition to minerals and hormones. Curds, therefore, would be a better source of nutritive material than whey on account of its additional protein and fat content. During the pro-

cess of curdling by fermentation the milk may be invaded by a variety of micro-organisms some of which may be pathogenic; but under controlled conditions it is a seat of various strains of streptococcus lactis, yeast and gram negative lactobacillus. Investigations of Najjar, Holt, Elvehjem and others have shown that such micro-organisms are able to synthesize some vitamins.<sup>4</sup> According to them such micro-organisms if found in the gastro-intestinal tract of animals, including human beings, would synthesize some vitamins<sup>5,6,7</sup> which could be utilized by the host in case of deficiency. It is, therefore, logical to believe that the micro-organisms responsible for curdling of milk would also synthesize, during their growth, some vitamins at the cost of other nutrients from milk. A probing investigation was, therefore, thought essential in order that the changes in the nutritive value of milk after curdling might receive a thorough study. The knowledge thus obtained would also be helpful in preparing curds of a high nutritive value.

As a preliminary measure the estimations of some members of vitamin B complex were undertaken. Curds was prepared by the usual household procedure. Samples of fresh whole milk were obtained from the local shop. The milk was boiled and cooled till it was only slightly warm. It was then inoculated with a very small quantity of preformed curds and left undisturbed for 24 hours at room temperature. By that time curds had formed. The sample of the milk as well as the curds from it were analysed for their vitamin contents by fluorimetric and colorimetric methods. The results are given in the following table.

TABLE I  
Thiamine, Riboflavin and Nicotinic acid  
contents of Milk and Curds

Sample No.	Thiamine µg per gm.		Riboflavin µg per gm.		Nicotinic acid µg per gm.	
	Milk	Curds	Milk	Curds	Milk	Curds
1	..	..	0.79	1.39	0.63	0.30
2	..	..	0.69	0.19	0.67	0.38
3	..	..	0.69	1.32	0.59	0.25
4	..	..	0.86	1.22	0.63	0.26
5	..	..	0.90	1.15	1.75	1.00
6	..	..	0.95	1.15	2.50	1.00
7	0.40	0.52	..	..	2.37	0.69
8	0.43	0.52	..	..	2.25	0.63
9	0.24	0.27	0.59	0.79	0.88	0.50
10	0.21	0.27	0.73	0.86	0.88	0.38
11	0.31	0.37	0.63	0.89	0.88	0.38
12	0.30	0.37	0.59	0.79	0.81	0.44
13	0.30	0.32	..	..	1.00	0.38
14	0.29	0.37	..	..	1.13	0.50
15	0.32	0.37	..	..	1.00	0.61
16	0.31	0.32	..	..	0.89	0.50

The results are interesting inasmuch as the riboflavin content was found to increase and nicotinic acid to decrease due to fermentative

changes. The changes in thiamine were not so marked. The results of these experiments show that it would be interesting to extend the study to the influence of fermentative curdling on other nutrients in milk such as proteins, fats and minerals. Moreover such data would be extremely useful if studies are carried out using individual micro-organisms for fermentation. Further work is in progress and will form the subject of detailed communications later on.

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#### SOME ANALOGUES OF D.D.T.

A RECENT publication<sup>1</sup> by E. A. Prill, A. H. Hartzell and J. M. Arthur on the alkoxy analogues of D.D.T., necessitates the publication of the results which we have already obtained in the condensation of chloral with various aromatic substances.

1. Chloral condenses to give D.D.T. type of compounds with anisole (m.p. 96°), *o*-cresol methyl ether (m.p. 94-96°), *p*-cresol methyl ether (m.p. 160°), resorcinol dimethyl ether (m.p. indefinite, decomposes before melting), thymol (m.p. 201°), *p*-chloroanisole (m.p. 146°) and bromo-benzene (m.p. 146°). All the m.p. are with decomposition.

2. Chloral condenses to give R-CHOHCCl<sub>2</sub> type of compounds with *m*-cresol methyl ether (m.p. 110°), hydroquinone dimethyl ether (m.p. 166°) and  $\beta$ -naphthol (no m.p.).

3. Chloral condenses to give amorphous noncrystallisable substances with all phenols (except phenol and thymol), veratrol, thymol methyl ether,  $\alpha$ -naphthol methyl ether,  $\beta$ -naphthol methyl ether and naphthalene.

4. Chloral did not condense with iodo benzene and *m*-dichloro benzene.

5. Bromal did not give D.D.T. type of compounds with any of the above substances. With alkoxy benzenes, however, bromal gives compounds of the type R-CHOHCCBr<sub>2</sub>.

A detailed description of these compounds along with their insecticidal properties will be published in due course.

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