

iridium directly on the emulsion of a photographic plate (Gevaert Super-Press 2,000). After 21 hours, development showed a neat photographic blackening (Fig. 1a). Similar attempts were repeated, arranging on the plate two similar iridium sheets, one irradiated, the other not so. The blackening was found only under the irradiated sheet. In subsequent attempts, the sheet was separated from the emulsion by interposing thin aluminium screens arranged in steps of increasing thicknesses: a blackening was found again, the intensity of which changes with the interposed thickness.

One of us (J. G.), having obtained a strong source of radio-phosphorus<sup>1</sup>, an exposure of this kind of 48 hours was made with radio-phosphorus; it gave the result shown in Fig. 1b. The copper rod covered with radio-phosphorus was about 1 mm. distant from the emulsion.

These first attempts show undoubtedly the photographic action of artificially produced radio-elements.

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<sup>1</sup> Govaerts, J., NATURE, **141**, 871 (1938).

### Specificity of the Salicylaldehyde Reaction of Csonka-Straub

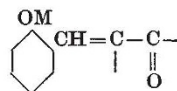
A SHORT time ago, Prof. A. E. Braunstein<sup>1</sup> discussed the specificity of the salicylaldehyde reaction proposed by Csonka for the determination of acetone and by Straub for the determination of pyruvic acid, and suggested that a positive reaction is obtained with all compounds containing a  $\text{CH}_3\text{CO}$  group linked directly to a hydrogen or carbon atom, and that the reaction is negative with carbonyl compounds which do not contain the aforementioned grouping. The mechanism responsible for this range of specificity was stated to involve the possibility or otherwise of enolization ensuing in a strongly alkaline medium, leading to the formation of an enolate the colour of which was attributed to a cumulated double bond system.

On this view, ethyl acetoacetate, which gives a positive reaction, must condense through its methyl group and not through its reactive methylene group—a most unlikely occurrence (compare the formation of salicylacetylacetone from salicylaldehyde and acetylacetone). Positive results have been obtained in the salicylaldehyde test with diethyl ketone, propionaldehyde, cyclohexanone and methyl cyclohexanone, all of which on Prof. Braunstein's hypothesis should have given negative results. Prof. Braunstein describes the colours obtained in the test as yellow. While this is true of very dilute solutions, with more concentrated solutions the colours obtained are varying depths of red, changing with dilution through orange to golden-yellow. The limit of detection is attained when the red tint fails to deepen appreciably the lemon-yellow colour given by salicylaldehyde in alkaline solution. Employing a relatively concentrated acetone solution (a few drops in 5 ml. water) in the test, there separate out on prolonged standing dark red prisms with a green metallic lustre, using sodium hydroxide, or glistening

bright red leaflets using potassium hydroxide. These have been shown to be the simple alkali salts of salicylaceton (sodium content 12.3 per cent). In very dilute solutions, where there is a large excess of salicylaldehyde, it is, of course, probable that disalicylaceton is also formed.

Similarly, benzalacetone yields a dark red sodium salt giving sodium 8.7 per cent. Acetophenone gives vermilion-coloured needles which on acidifying yield salicylaceton. The positive results given in the test by cyclohexanone and 1-methylcyclohexanone are supported by the observations of Borsche and Geyer<sup>2</sup> that the condensation products from salicylaldehyde and cyclohexanone and 4-methylcyclohexanone respectively give red solutions in alkali.

The mechanism of the colour reaction thus involves condensation of the salicylaldehyde with a methylene group in the  $\alpha$ -position to an unsaturated group such as carbonyl (CO) and the formation of a simple alkali salt of the resulting compound. The chromophoric grouping is therefore



where M is Na or K. The function of the carbonyl group is to activate the adjacent methylene group. Positive results have been obtained with a 3 per cent solution of cyanacetic acid, in which the methylene group is activated by the unsaturated  $-\text{C}\equiv\text{N}$  group. Negative results have been obtained with fluorene, the methylene group of which possesses a certain amount of activity, no condensation taking place in this instance.

The range of specificity of the salicylaldehyde reaction is thus by no means so narrow as stated by Prof. Braunstein and the enolization mechanism is untenable. The test is more sensitive for acetone than for any of the other substances examined, which included pyruvic acid, ethyl acetoacetate, acetophenone, benzalacetone, acetaldehyde, propionaldehyde, methyl ethyl ketone, diethyl ketone, cyclohexanone, methylcyclohexanone and cyanacetic acid.

It is hoped to publish full details of the investigation elsewhere in due course.

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<sup>1</sup> Braunstein, NATURE, **140**, 427 (1937).

<sup>2</sup> Borsche and Geyer, *Annalen*, **393**, 49 (1912).

### A New Method of Resolving a Racemic Compound

SINCE the introduction of Tswett's technique of chromatographic adsorption, this process has been applied successfully to the separation of many isomeric or closely related substances, including the chlorophylls and the components of natural carotene. A few attempts have also been made to employ it for the resolution of racemic compounds by use of an optically active adsorbent, but without positive results.

After examining a number of cases, we have now succeeded in effecting a partial resolution of inactive *p*-phenylene-*bis*-iminocamphor,  $\text{C}_{10}\text{H}_{16}:\text{N}:\text{C}_6\text{H}_4:\text{N}:\text{C}_{10}\text{H}_{16}$ ,