

## THE EFFECT OF ULTRA-VIOLET LIGHT ON COLLOIDAL GOLD

In a series of studies on the action of ionizing radiations on colloids, Crowther and Fairbrother<sup>1</sup> came to the conclusion that only positively charged colloids are coagulated by X-rays whereas negatively charged colloids are unaffected. As a cause of this phenomenon they have suggested that it is due to the gradual discharge of the charged colloidal particles by the ionisation produced in solution during the passage of the radiation. Lal and Ganguly<sup>2</sup> made a comprehensive study on the effect of ultra-violet light on colloids and observed that both positively and negatively charged colloids are affected. They assumed that coagulation was due to the photochemical decomposition of the stabilizer. Further evidence of the photochemical nature of the change has been given by Desai and others,<sup>3</sup> Ellinger,<sup>4</sup> and Haines.<sup>5</sup>

In the present communication, a study has been made with colloidal gold prepared in four different ways, *viz.*, with formaldehyde, tannic acid, hydrazine hydrate and ethereal solution of phosphorus. These sols were exposed to an "Alpine Sun" ultraviolet lamp for various periods of time and it was found that sols prepared with formaldehyde and hydrazine hydrate only coagulated whereas sols prepared with tannic acid and phosphorus remained unaffected.

Electrical conductivity of these sols were measured with different periods of exposure as recorded in the table below:

TABLE I

Sol prepared with formaldehyde

Time of exposure	Sp. conductivity $\times 10^4$
0 hr.	3.57 mho
3 hrs.	3.68 mho
8 hrs.	3.68 mho
16 hrs. (coagulated)	3.68 mho (coagulated)

TABLE II

Sol prepared with hydrazine hydrate

Time of exposure	Sp. conductivity $\times 10^4$
0 hr.	3.65 mho
5 hrs.	3.65 mho
8 hrs.	3.57 mho
16 hrs.	3.55 mho
21 hrs. (coagulated)	3.55 mho

It may be seen from the tables that the electrical conductivity of the formaldehyde sol increases with time of exposure whereas that of hydrazine hydrate sol decreases. Carruthers and Norrish<sup>6</sup> have shown that the primary product of photo-decomposition of formaldehyde is formic acid. With the formation of

formic acid the hydrogen-ion concentration of the system increases and hence the increase in conductivity. Brav and Cuy<sup>7</sup> have shown that the strength of dilute solutions of hydrazine hydrate decreases rapidly in presence of air. Gilbert<sup>8</sup> has shown that the presence of alkali increases the rate of oxidation and that greater the surface present the greater the oxidizing action. Since colloidal gold is slightly alkaline and a large amount of surface to present in the colloid, the hydrazine hydrate is quickly decomposed into nitrogen and hydrogen as observed by Elgin and Taylor.<sup>9</sup> The decrease in electrical conductivity and the instability of the sol formed with hydrazine hydrate is, thus, explained. Further details will be published later.

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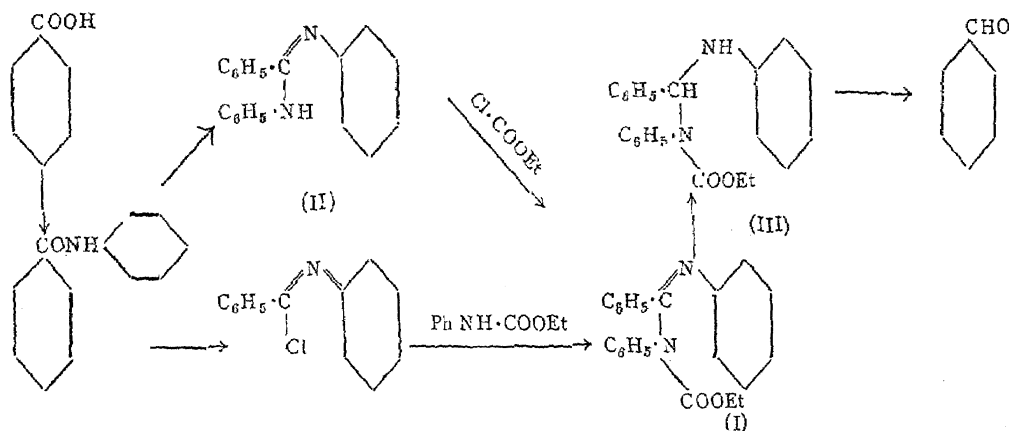
1. *Phil. Mag.*, 1927, **4**, 325; *ibid.*, 1928, **6**, 386.
2. *J. I. C. S.*, 1929, **6**, 547; *ibid.*, 1930, **7**, 513. 3. *Curr. Sci.*, 1934, **3**, 105. 4. *Nature*, 1936, **138**, 1014. 5. *Ibid.*, 1937, **139**, 32. 6. *J. C. S.*, 1936, 1036. 7. *J. A. C. S.*, 1924, **46**, 1786. 8. *Ibid.*, 1929, **51**, 2744. 9. *Ibid.*, 1929, **51**, 2059.

## A NEW METHOD FOR THE CONVERSION OF AROMATIC CARBOXYLIC ACIDS INTO THE CORRESPONDING ALDEHYDES

SHAH AND ICHAPORIA<sup>1</sup> observed that benzanilide imidochloride condensed with urethane to give N-phenyl-N'-carbethoxybenzamidine which suffered ring closure on heating furnishing 4-hydroxy-2-phenylquinazoline, this being a novel synthesis of such quinazoline derivatives. In continuation of this work phenyl urethane was condensed with benzanilide imidochloride. The resulting N : N'-diphenyl-N'-carbethoxybenzamidine (I), which could also be obtained by the reaction of N : N'-diphenylbenzamidine (II) with ethyl chloroformate, however, resisted all attempts at ring-closure.

During the study of the properties of this N-carbethoxybenzamidine (I) it was observed that it could be reduced by aluminium amalgam in moist ether or preferably in ethyl acetate to dihydrobenzamidine (III) which could readily be hydrolysed by cold dilute acid to benzaldehyde. This affords a new method for the conversion of an aromatic carboxylic acid to the corresponding aldehyde.

The following method essentially depends on the reduction of the N-carbethoxybenzamidine to the dihydro compound. Merling<sup>2</sup> observed that amidines derived from hydroaromatic acids can be reduced to diphenylmethylenediamine bases which on hydrolysis would yield the corresponding aldehydes. Sidiki and Shah,<sup>3</sup> however, have noted that in amidines derived



from aromatic acids -C=N-group cannot be reduced to -CH-NH- group. It would appear therefore that in the present case, the reduction is made possible on account of the presence of the N-carbethoxy group.

This new method has been applied to convert benzoic acids with various substituents like halogen, methyl, hydroxy, methoxy in ortho-, meta-, and para-positions, to the corresponding aldehydes and has been found of general applicability giving good yields at various stages.

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The condensation of benzanilide imidochloride with ethyl sodioacetoacetate has afforded an uncrystallisable intermediate condensation product namely, ethyl α-(phenyliminobenzyl)acetoacetate, which has been subsequently cyclised by heating under reduced pressure to give the hitherto unknown 4-hydroxy-2-phenyl-3-acetylquinoline.

The method of synthesis is quite general and has been extended to other substituted anilide imidochlorides and the corresponding 4-hydroxy-2-aryl-3-acetylquinolines, which are otherwise inaccessible, have now been prepared.

Detailed account of the above work will shortly be published elsewhere. This work is being extended to various other β-ketonic esters and β-diketones.

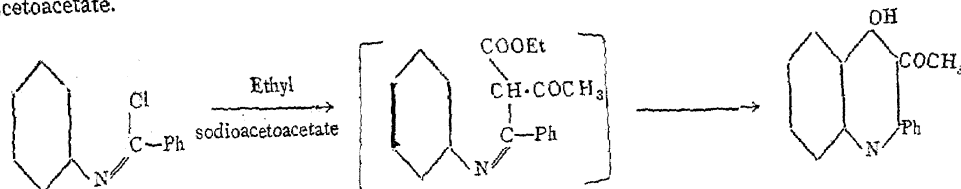
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### SYNTHESIS OF 4-HYDROXY-2-PHENYL-3-ACETYLQUINOLINES

IN continuation of the previous work<sup>1,2</sup> reported from this laboratory on the application of anilide imidochlorides to the syntheses of heterocyclic compounds, the condensation of benzanilide imidochloride with ethyl sodioacetoacetate has now been studied. The condensation of benzanilide imidochlorides with ethyl sodiomalonate<sup>3,1</sup> is known to give mono ethyl α-(Phenyliminobenzyl) malonates, which can be cyclised by heating to 4-hydroxy-2-phenyl-3-carbethoxyquinolines. No work however appears to have been done on the condensation of benzanilide imidochloride with ethyl sodioacetoacetate.



1. Shah and Heeramanek, *J. Chem. Soc.*, 1936, 428.
2. Shah and Ichaporia, *ibid.*, 431.
3. Just, *Ber.*, 1885, 18, 2025; 1886, 19, 983, 1452 1541.