

parachor of the classical formula. These authors<sup>8</sup> calculate on their system the parachor of acetic acid to be 130.6. Deducting their value for CH<sub>2</sub> (40.0), the value for the classical formula for formic acid comes out to be 90.6 which is sufficiently close to the observed value of 93.6.

It is clear therefore, and in this Dr. Seshadri agrees with me<sup>9</sup> that parachor values cannot be used to distinguish between the Sarkar-Ray and the classical formula for formic acid.

With regard to the abnormal chemical activity of formic acid, Mr. Heble, in this laboratory, has recently observed that formic acid reacts with acetyl and benzoyl chlorides to give the corresponding acid, HCl and CO. It also reacts on heating with benzyl chloride, benzal chloride, and benzo-trichloride with evolution of HCl and CO; on these reactions a method of estimating side-chain halogen has been based.

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<sup>1</sup> *Curr. Sci.*, 1936, 4, 812.

<sup>2</sup> *Curr. Sci.*, 1936, 4, 650.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> *2nd Supplement*, 5th Edition, 1931, pp. 172, 173, 175, 177.

<sup>5</sup> Cf. Bhatnagar and Singh, *J. Chim. Phys.*, 1928, 25, 21.

<sup>6</sup> *J. Indian Chem. Soc.*, 1935, 12, 813.

<sup>7</sup> *Loc. cit.*

<sup>8</sup> *J.C.S.*, 1929, 2128.

<sup>9</sup> *Curr. Sci.*, 1936, 4, 813.

### Decolourising Action of Fuller's Earth.

THE decolourising action of fuller's earth and its activation by acids have not yet been satisfactorily explained on chemical or physical basis. Earlier attempts deal with either the chemical constituents of the earth,<sup>1,2</sup> or with the usual absorption theories.<sup>3</sup> Recently Thurman<sup>4</sup> attempted to show the relationship between the pH of the earths and their decolourising action. But according to him, addition of acid or alkali decreased the decolourising power of a Florida earth. Fogle and Ohn<sup>5</sup> attributed the clarifying action of the fuller's earth to its zeolite content, but account has not been taken by these authors of an important characteristic property of these earths, of liberating acid on being shaken with a salt solution.<sup>6</sup> In the course of our work on the activation of fuller's earths obtained from different parts of India, for decolourising vegetable oils, we found that the pH of a solution of sodium chloride after treatment with earths varied in the same manner as the change in the Lovibond units of colour of a sample of groundnut oil treated with the earths. The bleaching values were determined by agitating a sample of neutral groundnut oil with 2 per cent. of the earth at 90°–95° C. and matching the colour with a Lovibond tintometer. For activation, the earths were treated with hydrochloric acid of 19–20 Be' (added as 20 grams of dry HCl per 100 grams of the earth) under reflux for three hours, and washed.<sup>7</sup> For

TABLE I.

No.	Source	Original		Treated with acid and washed			
				Heated to 110° C.		Heated to 400° C.	
		Change Lovibond Units	pH	Change Lovibond Units	pH	Change Lovibond Units	pH
1	Florida .. ..	3.3	3.74	3.1	3.24	3.1	4.02
2	Kolhapur .. ..	1.4	7.22	2.9	3.76	2.0	4.95
3	Jodhpur .. ..	2.4	7.82	2.9	3.47	3.2	3.91
4	Bhawanagar .. ..	1.1	8.81	3.0	4.10	3.2	4.70
5	Murwara, C.P. .. ..	1.4	7.48	1.3	4.71	2.1	6.36
6	Germany .. ..	3.2	3.50	3.3	3.45	3.3	3.60

pH measurements 50 c.c. of one per cent. solution of sodium chloride was shaken with 0.5 gram of the earths. The table given above gives some of the results which are graphically shown in Fig. 1.

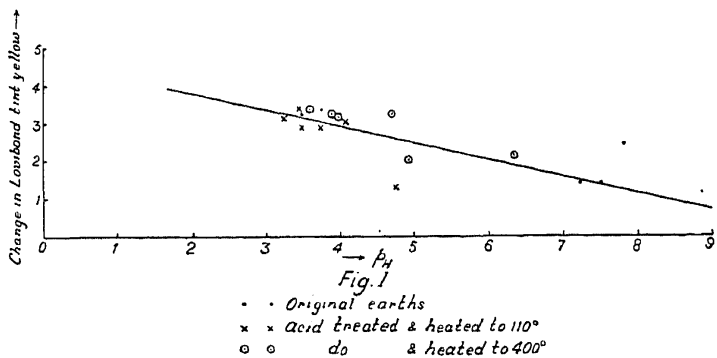


Fig. 1.

The accuracy of the colour measurements as compared with the accuracy of the pH measurements by the quinhydrone electrode is limited by the use of the Lovibond Tintometer and accounts for the discrepancies. Our results, however, indicate that the decolourising action and the activation by acids of these earths are directly related with the exchangeable hydrogen contained in the earth. While thus indirectly supporting the conclusion of Fogle and Ohn regarding the zeolitic nature of the active ingredient in the fuller's earth, our results show that it is not "calcium" zeolite but "hydrogen" zeolite that is active in decolourising. It is possible that the action of the zeolite is replaced by the hydrogen ion during the process of activation by acids, the hydrogen in turn being replaced by the sodium ion when treated with the salt solution, both reactions being governed by the law of mass action. The "hydrolytic adsorption," by other clays can be explained on the same basis. Further work is in progress.

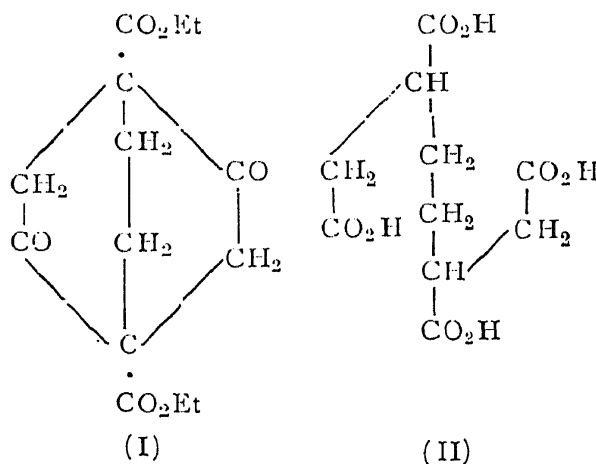
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*p*-Bridging of Succinosuccinic Ester.

CONSIDERING the products obtainable from succinosuccinic ester by bridging the *p*-carbon atoms with methylene iodide or ethylene bromide "to be of extremely great interest," Baeyer<sup>1</sup> tried the experiments evidently without success. The non-formation of a strainless tricyclic system from bicyclic nonanedionetetracarboxylic ester, alike Baeyer's failure, were attributed by Meerwein<sup>2</sup> to the splitting up of the bridged compounds by alkali.

After a large number of attempts made under varying experimental conditions, the desired bridge formation has now been effected by boiling dry sodio-derivative of succinosuccinic ester under reflux during 72 hours with ethylene and trimethylene bromides, the resulting compounds melting at 112° and 132° respectively. That the reactions have not taken place in the enolic phase, is proved by the fact that the bridged compounds give sharp melting disemicarbazones. The bridged esters are easily hydrolysed to the corresponding diacids, m.p. 274° and 238° respectively by boiling with dilute HCl (1:1) and these acids, in turn, give sharp melting disemicarbazones. It is interesting to note that the bridged esters cannot be decarboxylated under conditions in which succinosuccinic ester readily gives 1:4-diketohexamethylene. The compound, m.p. 112° (I) on treatment with 10 per cent. alcoholic potash suffers ring fission to yield, what appears from combustion analysis and equivalent determination to be  $\beta\beta'$ -dicarboxysuberic acid, m.p. 170° (II) as yet unknown and on treatment with 1.5 per cent.



<sup>1</sup> Welds, *Z. Angew. Chem.*, 1927, **40**, 7982.  
<sup>2</sup> Haseman, *J. Phys. Chem.*, 1929, **33**, 1514.  
<sup>3</sup> Neuman, *Z. Angew. Chem.*, 1927, **40**, 337.  
<sup>4</sup> Thurman, *Ind. Eng. Chem.*, 1932, **24**, 1189.  
<sup>5</sup> Fogle and Ohn, *Ind. Eng. Chem.*, 1933, **25**, 1070.  
<sup>6</sup> Bancroft, *Applied Colloid Chemistry*, 3rd Ed., p. 146, McGraw-Hill, 1932.  
 Also Cf. Chameron, *J. Phys. Chem.*, 1910, **14**, 400.  
<sup>7</sup> Burgharat, *Ind. Eng. Chem.*, 1931, **23**, 801.

neutral permanganate it gives an acid, m.p. 150° which, however, seems to be