

spongy iron is obtained by calcining with coal the residues from copper pyrites.

Dr. Thudichum thought that the whole fungus theory was nothing better than a vague and wild surmise.

Mr. Warrington: That water which had passed through iron-sponge does not yield fungi on addition of sugar may be due to the removal of the phosphoric acid which had been retained by the hydroxide of iron wherewith the sponge is covered. As to the experiments with charcoal I wish to observe that water filtering through fresh charcoal takes away from it some phosphates, but after the filter has been used for a time, this will no more be the case. This circumstance may perhaps explain the difference in the observations of Messrs. Frankland and Heisch.

Dr. Dupré asked whether Dr. Frankland and Mr. Heisch had boiled their sugar-solutions before mixing them with the waters to be examined? Whenever he (Dr. Dupré) did so, he obtained no fungi.

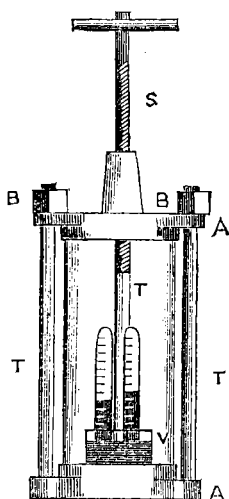
Dr. Frankland replying [to Dr. Dupré]: My sugar-solutions were not boiled, but in Experiment No. 9 the water had been previously boiled for a long time, and the sugar and all the other substances heated to a much higher degree than that of boiling water, and I obtained more splendid fungi here than in any other case. [To Mr. Heisch.] The difference in our observations regarding animal charcoal appears to be satisfactorily explained by Mr. Warrington's observations. As to the two fungi, from sewage and from white of egg, I merely pronounced them to be similar to, but not identical with one another. I paid no particular attention to the emission of butyric smell. [To Mr. Bell.] I investigated the effluent water about 24 hours after its collection. (Here Dr. Russell remarked that he had done the same.) [To Dr. Voelcker.] I have also found that sewage is apt to have its ammonia converted into nitric acid.

IX.—On the Effects of Pressure on the Absorption of Gases by Charcoal.

By JOHN HUNTER, M.A., F.C.S., F.R.S.E., Professor of Mathematics and Natural Philosophy, University of King's College, Windsor, Nova Scotia.

IN the following memoir, I purpose giving the results of a few observations on the effects of pressure on the quantity of a gas absorbed by cocoa-nut charcoal.

The form of apparatus employed in order to obtain pressure in these experiments, presents the great advantage of being easily taken to pieces, and when very high pressures are not required, I have found it to work admirably. Two strong copper plates (A A) are connected by means of three iron rods (T T T) firmly fastened to the lower, and passing through holes in the upper plate, where they are made secure by screws, and nuts (B). Each plate contains a groove in which is placed a leather washer, covered on the exposed surface with a mixture of white lead and grease. The ground ends of a thick glass cylinder are fitted against the leathers, and when the plates are screwed together, a strong joint is formed capable of resisting a pressure of about five or six atmospheres. The pressure is produced by first filling the glass cylinder quite full of water, and then introducing into it an iron screw (S), which works through leather packing.



In performing an experiment, a vessel (V) containing mercury is placed on the lower plate. Two tubes are inverted in the mercury; one partially filled with dry air, acts as a manometer; the other contains a fragment of charcoal and the gas under examination. The original volume of the gas is read off before introducing the charcoal into the tube, and after a sufficient time has elapsed, the amount of absorption is carefully determined. The glass cylinder is then placed over the tubes and the upper secured to the lower plate by means of the screws. The interior of the apparatus is now filled with water, and the pressure produced after the screw is measured by observing the volume of the air in the manometer tube. The corresponding diminution in the volume of the gas in the absorption tube is also read off, and since we know the original volume of the latter, we can easily calculate what it ought to be at each increase of pressure, and the difference between the observed and calculated volumes gives the absorption.

From the necessity of employing a comparatively small quantity of the gas in each experiment, rarely more than 5 or 6 c.c., the differences corresponding to each increase of pressure are not so regular as I could have wished; nevertheless, in comparing the results contained in the following tables it may be observed, first: that the amount of absorption increases with the pressure to which the gas is exposed; and, secondly, the same change of pressure produces about the same amount of increase in the quantity of each gas absorbed.

It is worthy of observation that if we compare the relative weights

of the absorbed gases in the following tables, we find that cocoa-nut charcoal absorbs a greater weight of cyanogen than of either ammonia or carbonic anhydride.

In the tables of absorptions :—

V = the volume of gas absorbed by one volume of cocoa-nut charcoal at 0° C. and the corresponding pressure.

P = the pressure in millimetres to which the gas is exposed.

Ammonia.

First Series.		Second Series.		Third Series.	
V.	P.	V.	P.	V.	P.
170·4	760·0	170·7	760·0	165·5	760·0
173·0	1102·0	174·3	1104·3	166·4	850·7
176·9	1170·4	176·0	1178·0	173·0	1380·2
178·2	1367·2	178·2	1269·2	176·9	1639·8
179·5	1479·7	180·8	1369·5		
		183·5	1486·5		
		188·7	1795·1		
		196·7	2002·6		
		209·8	2608·5		
Fourth Series.		Fifth Series.		Sixth Series.	
V.	P.	V.	P.	V.	P.
170·6	760·0	174·2	760·0	172·7	760·0
171·7	1013·8	177·0	1278·4	178·2	828·5
173·0	1095·9	182·2	2407·9	180·8	950·2
176·9	1149·1			183·5	1024·9
				184·8	1112·9
				187·3	1217·3
				190·0	1343·5
				194·0	1498·7
				197·5	1693·9
				201·9	1955·9

Carbonic Anhydride.

First Series.		Second Series.		Third Series.	
V.	P.	V.	P.	V.	P.
78·2	760·0	61·7	760·0	71·1	760·0
91·1	1009·3	84·5	1480·7	76·9	892·4
91·7	1073·8	86·0	1688·1	77·4	962·9
93·1	1333·6	87·7	2397·0	77·9	1045·6
96·6	1450·5	95·0	2910·8	78·4	1143·7
		102·1	3858·2	80·0	1262·2
				81·1	1408·0
				82·5	1594·5
				88·6	2143·4

Carbonic Anhydride—continued.

Fourth Series.		Fifth Series.	
V.	P.	V.	P.
69·7	760·0	73·2	760·0
79·5	938·6	84·0	927·9
80·5	1035·6	85·5	1014·6
81·5	1155·9	87·3	1100·2
82·0	1306·4	91·6	1412·8
84·5	1503·3	95·5	1625·6
85·8	1778·4	100·4	1912·9
86·1	2190·3	108·0	2324·1
		113·0	2960·2
		132·4	3793·2

Cyanogen.

First Series.		Second Series.		Third Series.	
V.	P.	V.	P.	V.	P.
103·5	760·0	106·7	760·0	106·6	760·0
106·8	960·8	107·7	1146·8	114·1	1011·2
107·7	1051·1	108·5	1510·6	115·0	1143·3
109·9	1159·9	109·0	1886·3	117·1	1315·1
112·8	1293·5	109·9	2403·1	118·4	1880·2
114·5	1463·0				
116·3	1681·9				
129·2	1980·5				

Fourth Series.		Fifth Series.		Sixth Series.	
V.	P.	V.	P.	V.	P.
103·2	760·0	107·5	760·0	102·5	760·0
105·1	1031·3	107·7	1169·6	103·4	1212·3
106·8	1101·2	110·3	1291·2	104·7	1338·4
108·5	1182·5	112·0	1628·8	106·4	1493·4
110·3	1276·0	115·4	1873·4	112·0	1942·5
111·3	1335·5	121·0	2204·7	119·3	2286·8
112·2	1515·4	124·9	2678·2		
113·3	1865·8				