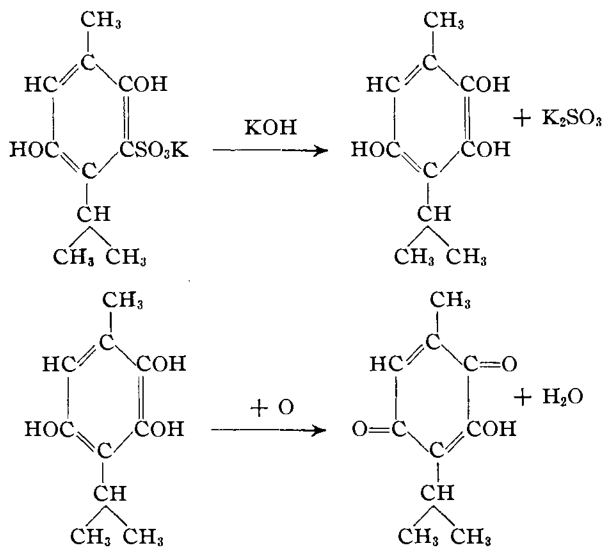
The specific gravities of the mixtures were determined at 20° C. ± 0.5 in a pycnometer of the Geissler type.[1]

The results are plotted on the foregoing graph, and yield as expected a straight line when the points are connected. Hence, by determining the specific gravity of a mixture containing chloroform and benzyl alcohol, and referring to the graph, the composition may be readily determined with a reasonable degree of accuracy.

RATE OF OXYGEN ABSORPTION BY CARSTANJEN'S COMPOUND UPON THE ADDITION OF AN ALKALI.*

BY A. A. HARWOOD.

It was observed by Carstanjen[1] that upon addition of an alkali to a solution of 1-methyl-4-isopropyl-2,5-hydroxy-3 or 6-potassium sulphone benzene, it assumed a dark red color. He believed this to be due to the absorption of oxygen from the air. The reaction possibly takes place in the following manner:



According to the above reactions one molecule of Carstanjen's compound in aqueous solution should absorb one-half molecule of oxygen.

Experimental Procedure.—An apparatus was constructed in which it was possible to introduce, without admitting air, first Carstanjen's compound in aqueous solution into a reaction chamber, then an equimolecular amount of KOH also in aqueous solution. The accompanying sketch of the apparatus will illustrate the manner of manipulation.

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[1] See for example: "Food Analysis" by A. G. Woodman or any other standard work on analytical methods.

* Presented to the Scientific Section. Part of a thesis presented as one of the requirements for the doctor's degree, University of Wisconsin.

[1] *J. prakt. Chem.*, 123 (1877), 478.

Two grams of the Carstenjen's compound in 25 cc. of water were introduced into tube B through stop-cock H by lowering bulb A and opening the stop-cock H so as to let the solution run in without admitting any air, the mercury level initially being up to H. The aqueous KOH solution was then introduced as before allowing a few drops to remain in tube F. Oxygen was then allowed to flow through tube G into the gas burette D displacing the water in the burette down to about the 100-cc. mark. The volume of the oxygen was then determined at atmospheric pressure by use of the leveling tube E. After this the stop-cocks I and H were placed in the correct position to allow the oxygen to pass from D to B. After remaining in B for approximately five minutes, the oxygen was forced back over into D by raising bulb A until the top of the combined solution came up to H. The remaining oxygen in burette D was then measured as before. This procedure was repeated until no further diminution of volume was noted. The results are herewith recorded:

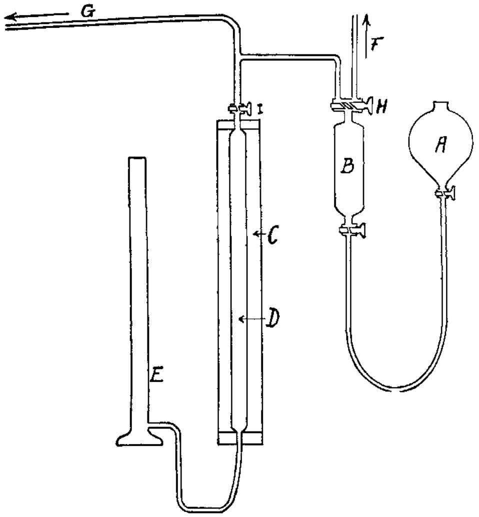

Fig. 1.

Experiment I.—(The absorption chamber was not shaken during the experiment.)

Amount of Carstanjen's compound in 25 cc. of water.	KOH in 15 cc. water.	Time.	Min.	Reading of O_2 vol., cc.	O_2 used, cc.	O_2 (std. cond.) absorbed per gram mole. Liters.	
2.00 Gm.	0.5 Gm.	4:50	0	99.5	0		Bar. P. 734.0
		4:55	5	59.8	39.7	4.9625	Temp. 27.0° C.
		5:00	10	37.2	62.3	7.7875	
		5:05	15	29.0	70.5	8.8125	
		5:10	20	22.8	76.7	9.5875	
		5:15	25	20.0	79.5	9.9375	
		5:22	32	17.0	82.5	10.2325	
		5:30	40	15.2	84.3	10.5375	
		5:35	45	14.6	84.9	10.6125	
		5:42	52	13.8	85.7	10.7125	
		5:50	60	12.7	86.8	10.8500	
		6:00	70	10.9	88.6	10.9250	
		6:05	75	10.0	89.5	11.0750	
		6:08	78	9.4	90.1	11.1875	
		6:12	82	8.8	90.7	11.2625	
		7:00	130	5.0	94.5	11.3375	
		7:15	145	4.2	95.3	11.8125	
		7:30	160	4.2	95.3	11.8125	

95.3 cc. reduced to standard conditions of temperature and pressure = 88.8 cc. or 0.1197 Gm.

Experiment II.—(The absorption chamber was shaken by hand during the experiment.)

2.00 Gm.	0.5 Gm.	8:45	0	100.3	0		
		8:50	5	55.5	44.8	5.6500	Bar. P. 738.2
		8:57	12	43.7	56.6	7.1310	Temp. 25.5° C.
		9:05	20	35.7	64.6	8.1396	
		9:13	28	25.0	75.3	9.4878	
		9:16	31	21.5	78.8	9.9288	
		9:23	38	17.7	82.6	10.4076	
		9:35	50	17.7	82.6	10.4076	

82.6 cc. reduced to standard conditions of temperature and pressure = 73.4 cc. or 0.1049 Gm.

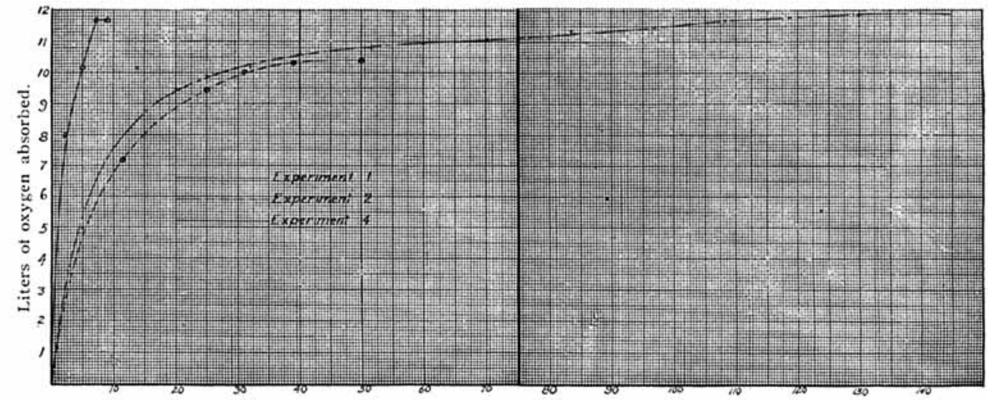

Fig. 2.

Experiment III.—A third experiment was made without determining the rate. It resulted in an absorption of 84.1 cc. of O_2 which is equivalent to 0.1199 Gm. of O_2.

Experiment IV.—A fourth determination was made in the same manner as those above with the exception that bulb B was placed on a mechanical shaker which moved back and forth 200 times a minute.

Amount of Carstanjen's compound of 25 cc. of water.	KOH in 15 cc. water.	Time.	Min.	Reading of O_2 vol., cc.	O_2 used, cc.	O_2 (std. cond.) absorbed per Gm. mole. Liters.	
2.00 Gm.	0.5 Gm.	2:42	0	97.0	0		
		2:44	2	30.2	66.8	8.023	Bar. P. 726.8
		2:47	5	7.4	89.6	10.764	Temp. 29.0° C.
		2:49	7	2.1	94.9	11.658	
		2:51	9	2.1	94.9	11.658	

The fourth experiment reveals the striking rapidity with which the oxygen is absorbed under favorable conditions. 94.9 cc. reduced to standard conditions of temperature and pressure = 82.1 cc. of O_2 or 0.1163 Gm.

According to the equations given above, one-half molecule of oxygen should be absorbed by one molecule of Carstanjen's compound. Therefore, 284 Gm. should absorb 11,190 cc. of O_2 ($^1/_2$ of 22.380 cc.) and 2 Gm. should absorb 78.8 cc. (0.1126 Gm.).

From the above results it would appear that the equations given are a true picture of the reaction.

The following graphs are plotted with the liters of oxygen absorbed by a gram-molecular amount of Carstanjen's compound, treated with a gram-molecular amount of potassium hydroxide, against the time, in minutes, required to absorb the oxygen.

Experiment V.—To avoid the obvious errors in time exposed, the oxygen was transferred to the reaction chamber and allowed to remain during the entire course of the experiment. The reaction chamber was placed in a shaking machine and shaken during the time the solutions were exposed to the action of the oxygen. In this manner the following results were obtained:

Wt. of Carstanjen's compound.	Wt. of KOH.	Cc. of O_2 abs.	Wt. of O_2 abs.	Time.
2.0 Gm.	0.5 Gm.	82.1	0.1163 Gm.	7 min.
1.0 Gm.	0.25 Gm.	44.0	0.0620 Gm.	2 min.
0.5 Gm.	0.14 Gm.	28.0	0.0395 Gm.	1 min. 35 sec.
0.25 Gm.	0.085 Gm.	14.8	0.0209 Gm.	1 min. 30 sec.
0.10 Gm.	0.045 Gm.	5.2	0.0073 Gm.	1 min. 5 sec.

These reactions are of special interest to the student of the biochemistry of the Monardas and other plants containing thymoquinone and its hydroxy derivatives.

FROM THE LABORATORY OF EDWARD KREMERS.

CHEMICAL CONSTITUTION AND ANTHELMINTIC ACTION.*

BY ANTOINE E. GREENE.

Having studied a large number of the commonly employed anthelmintics, the writer attempts to group them into definite classes, according to similarity in chemical structure and analogous pharmacological action.

Six groups are drawn off. There are the following groups which might conveniently fall into an orderly classification according to the modern system: 1, Paracymene or Thymol Group; 2, Phlorglucinol-Butyric Acid Group; 3, Lactone Group; 4, Alkaloid Group; 5, Halogen Group; 6, Heterogeneous Group.

The writer submits this chemical classification to provoke the study of these drugs and medicaments in the light of chemical structure and relationship and corresponding medicinal action. The question is raised whether synthetical organic chemistry may some day furnish medicine an "Anthelmintic Molecule" which will possess all of the desirable and none of the undersirable and dangerous properties of those drugs which are employed to-day in helminthic therapy.

The present trend in synthetic organic chemistry and pharmacology is to interpret and predict the physiological action of drugs and synthetics on the basis of chemical structure. It has been found that the position of substituents in aliphatic chains and aromatic nuclei may profoundly affect the color, odor, taste and toxicity of the molecule. The introduction of alkyl, hydroxyl, carboxyl and amino groups may modify the solubility, stability and pharmacology of many drugs of the cyclic series. Stereoisomerism plays a part in the pharmacodynamics of medicinals, for optical isomers may evidence great differences in characteristic physiological reactions when tested on animal or vegetable organisms. It is only necessary to consider phenol and salicylic acid, aniline and acetanilide and phenol, resorcinol and hexyl-resorcinol to note how the presence of substituents may alter

* Scientific Section, A. PH. A., Baltimore meeting, 1930.