

sition: First, that different soils will have different phosphate ion concentrations, depending in each instance on the concentration of their other solutes and the reaction of their solutions. Second, that the phosphate concentration of the solution in a given soil will fluctuate also in accord with the concentration of other solutes and changes in reaction.

Any diminution of the concentration of solutes in the soil solution which reduces the active mass of cations tending to form relatively insoluble phosphates or which diminishes the buffer effect of the solution should tend to increase the phosphate concentration. The measurement of this effect has heretofore been impossible because no method has been available for the precise measurement of concentrations in the soil solution. The writers, following the suggestion of Parker, have recently shown¹ that solutions displaced from tightly compacted soils have uniform concentrations in their successive increments up to the time the displacing agent (water) begins to appear and that the total concentrations of electrolytes in such displaced solutions are inversely proportional to the total initial moisture contents of the soil. Such solutions apparently represent very closely, if indeed they do not constitute, the soil solution. Using such a procedure, we have demonstrated (unpublished data) that after a volume of solution equal to the amount of water initially contained in the compacted soil has been removed, the solutions obtained from a second displacement of the same mass of soil with an equal amount of water have decreasing total concentrations of electrolytes, but that the phosphate concentrations increase. This effect has doubtless been obscured in leaching experiments, because the leached soils have not been sufficiently compacted to prevent the admixture of the soil solution with the water poured on the top of the soil mass.

The importance of the above stated fact is that at the approach of the end of the growing season, the generally recognized diminished total concentration in the soil solution may be, and probably is, accompanied by an enhanced, or tendency toward an enhanced, concentration of phosphate. We have observed what appears to be the result of this effect in two soils, cropped to barley, during the past season, when the solutions displaced at the end of the season had very much higher concentrations of phosphate and lower concentration of other electrolytes than did the solutions displaced at the beginning of the season. It is evident that this effect may be masked by experimental error in soils of low total concentration or by increased absorption on the part

of the plant if the crop being grown on the soils under observation absorbs very large amounts of phosphate in the later stages of growth.

In the latter case, while the effect may not be measurable, its existence should contribute to a greater absorption of phosphate by the plant. This effect, if generally confirmed, should explain many of the anomalies of phosphate behavior in plant nutrition and obviate the necessity for assuming any special mechanism such as the excretion of plant acids to account for the relatively large phosphate absorption as compared with low phosphate concentration in the soil solution.

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QUOTATIONS

CHEMISTS IN HIGH PLACES

IN Rochester they tell the story that the Research Laboratory of the Eastman Kodak Company was founded by Mr. Eastman after a visit to Germany, during which a prominent industrialist boasted of his own research staff and asked Mr. Eastman how many chemists he employed upon research.

C. E. K. Mees, who had been managing director of Wratten & Wainwright, of England, from 1906 to 1912, came to be director of the Research Laboratory in the latter year, and began to make his intimate acquaintance among American chemists at the meeting of the Eighth International Congress of Applied Chemistry. He has become prominent among American chemists, and notwithstanding his increasing duties with his company, has had time to contribute much to the success of the Rochester local section. We can commend such activity to the many other plant executives. The Superintendents' Club at Kodak Park can offer many an interesting story of the early experiences of Dr. Mees as one of their number.

Not long since there were added to the duties of directing research those incident to development, which carries with it the responsibility of investigating and advising new departures in manufacture, based either upon the company's own discoveries or suggestions from others. We are pleased to say that Dr. Mees has since been made a director of the Eastman Kodak Company, the election taking place at a recent meeting of the directors. This promotion is pleasing personally, and is of interest to all chemists, proving as it does that a man properly qualified and trained, and with a willingness really to work may succeed in reaching the highest places in a corporation

¹ "Water Displacement of Soils and the Soil Solution," Burd, John S. and Martin, J. C. In the *Journal of Agricultural Science*, Vol. XIII, Part III, July 1923.

by the chemical route. Having made a specialty of photographic theory and having a keen appreciation of scientific work both fundamental and applied, we venture the prediction that no director of the company will contribute more to the success of the corporation than Dr. Mees.

The election of chemists to high places in industrial organizations should not be so infrequent as to need editorial comment. The valuable qualities which the Eastman Kodak Company has discovered in Dr. Mees may be found by other commercial organizations among their own scientific staff. We venture to suggest that such an inquiry would reveal many men qualified to take such increased responsibility in the management of the company's affairs. Such a man will, of course, have native ability, made more valuable by the special training which a thorough grounding in chemistry and allied subjects is sure to give. With a little encouragement he will be able to pass sound judgment in differentiating between essentials and non-essentials in business, just as he must do in the course of his chemical work.—*Journal of Industrial and Engineering Chemistry*.

COMMITTEE ON LUMINESCENCE

THE Committee on Luminescence of the National Research Council met at Ithaca, N. Y., on August 17th. Present were Messrs. C. D. Child, H. L. Howes, H. E. Ives, E. L. Nichols and Miss Frances G. Wick.

Mr. Child reported on the present status of our knowledge of the luminescence of mercury vapor and suggested that special attention be called to the following phenomena of mercury vapor which deserve further investigation: (1) The continuous spectrum which may be obtained under certain conditions of pressure and temperature, (2) the abnormal broadening of the absorption spectrum which occurs with increasing pressure of the vapor, (3) the fact that the luminosity of the continuous spectrum does not commence at the instant the vapor is excited and that it continues for an appreciable time after the excitation has ceased, (4) the increase in chemical activity occurring under the same conditions as those required for the continuous spectrum, and (5) the apparent decrease in the ionization potential occurring under the same conditions. The following explanations which have been suggested should be tested further: (1) That newly vaporized vapor is more active in giving the continuous spectrum than other vapor, and (2) that molecules are formed from excited atoms, that is, from atoms in which an electron has been removed to an outer orbit.

Mr. Howes gave a résumé of investigations of the luminescence of the rare earths and in particular of

the extended researches of Urbain in this field.

Mr. Ives reported on the relations between the photo-electric effect and luminescence so far as the same have already been developed and urged that observers in these fields should keep in mind the importance of more definitely determining the nature of such interdependences as may exist.

Mr. Nichols discussed the structure of luminescence spectra. He announced that measurements made under his direction, and soon to be published, indicate that the apparently continuous luminescence spectra of solid solutions in general are made up of submerged, over-lapping bands having a constant frequency interval and that this interval is characteristic of the activating element; also that the spectrum of incandescent oxides, of flames containing burning metals such as magnesium, calcium, aluminum, etc., and probably of all incandescent solids, have the structure above described.

Miss Wick described studies of the luminescence spectra of certain natural fluorites previously heated to fusion. Instead of the relatively broad bands observed by Urbain and others in such fluorites, the modified spectrum consists of fine lines readily identified as those of samarium, europium, dysprosium, etc.

The phosphorescence of these fluorites is greatly increased and prolonged by such heat treatment.

By invitation Messrs. D. T. Wilber and L. J. Boardman sat with the committee.

E. L. N.

SPECIAL ARTICLES

ULTRAMICROSCOPICALLY OBSERVABLE FLUORESCENCE

SINCE my last communication on the fluorescence of the blue-green algae, in which I expressed reserve regarding its visibility in chloroplasts, I have been able to demonstrate to others, observers of the highest competence, and thus to assure both them and myself that the chloroplasts of the leaves and of the green algae examined by me exhibit a marked degree of deep red fluorescence observable with the dark field condenser, when the optical conditions described (SCIENCE 58: 91-2. 3 Aug. 1923) are fulfilled. This observability gives new impulse to the study of the chloroplast.

Suspensions of living cells of a *Scenedesmus* and of a *Monostroma* are fluorescent to the eye when examined in a dark room in a narrow beam of strong light of w. l. approx. 530 and less, and their spectra in this light exhibit a strong band in the red, as K. Stern found for *Chlorella* (Ber bot. Ges. 38: 28. 1920). The same general statement may be made for suspensions of chloroplasts in water and in glycerine.