Detection of a Latent Image in Thallous Bromide

So far as I am aware, there is no evidence in the literature that the compounds of any element, other than silver, possess the property exhibited by silver halides of recording an invisible—and chemically undetectable—latent image under the influence of light, such image being afterwards convertible into a visible image by suitable processing. Experiments which I have recently made with emulsions of thallous bromide in gelatine have conclusively shown that *thallous bromide* is also capable of receiving a latent image. Direct reduction of the exposed thallous bromide to yield an image in metallic thallium is not possible, the most powerful reducing solutions being without effect. But by bathing the exposed thallous bromide in silver nitrate solution a double decomposition takes place, the thallium in the emulsion being replaced by silver *without destruction of the latent image*; after washing out the excess of soluble silver, the plate can be developed and fixed in the same way as any ordinary photographic plate.

There is considerable interest in the transference of the latent image during the conversion of the thallous bromide into silver bromide, because it indicates a fairly high degree of stability in the latent image. Since thallium is much more electro-positive than silver, this is surely remarkable if—arguing on the generally accepted theory for silver emulsions—the latent image on thallous bromide consists of atomic thallium. Moreover, photomicrographs of the same set of crystals, before and after treatment with the silver nitrate solution, show that the replacement of thallium by silver takes place, so far as can be seen, without any alteration in crystal shape or structure.

The normal colour-sensitivity of thallous bromide emulsions is in the blue-violet, with maximum in the neighbourhood of 420 mμ (Pointolite lamp), and they may be colour-sensitised by treatment with dyes in the same way as silver emulsions. Attempts to obtain the high degree of sensitivity of silver emulsions have, so far, failed, the fastest thallium emulsion obtained having a speed comparable with that of a silver-iodo-bromide emulsion of the lantern type.

A full report on this work will be published elsewhere in due course.

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Jan. 15.

Influence of Temperature on *p*H Measurements in Alkaline Media

Antimony and other suitable electrodes are used frequently for the quick determination of *p*H values in highly alkaline media, but in industrial research papers giving alkaline *p*H values the temperature of the measurement is often omitted.

Whereas, however, *p*H values in acid media are nearly independent of the temperature, and can be corrected for temperature differences, if necessary, by a correction factor which gives the 'true' value, valid over a range of several degrees, the *p*H values in alkaline media depend on the solubility-product law, and cannot be assumed to be constant over a range of temperatures. Thus an alkaline *p*H measured at $t_1°$ C., with an apparatus giving direct readings for $t_2°$ C., can be corrected to give $p\mathrm{H}_1$, the 'true' value, at t_1. In order to get the *p*H value at any other temperature, $t_3°$ C., we have $p\mathrm{H}_3 = p\mathrm{H}_1 + \log K_1 - \log K_3$, K_1 and K_3 being the solubility products at t_1 and t_3. Thus a soil, having $p\mathrm{H} = 8{\cdot}50$ at 15°, has 8·16 at 25° (taking the K values from L. Michaelis, "Wasserstoffionenkonzentration", Berlin 1922), 7·99 at 30° and 7·68 at 40°! An alkaline artificial culture medium, kept at 37°, has a *p*H 0·22 less than the measured value at 30°; an alkaline technical solution, measured in a room 3° colder than the factory, has a *p*H 0·10 less than the measured value.

The introduction of activity factors does not essentially modify the conclusion that alkaline *p*H values without temperature indication are useless. It is therefore very desirable that international agreements should be made as to the temperatures to which alkaline *p*H values should be referred; for example, one for soils, one for the alcohol industry and so on. In this way, mistakes might be avoided and research facilitated.

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Cultivation of the Unfit

In Nature of January 11, in an article by E. W. M. headed "Cultivation of the Unfit", the statement is made that wolves had been imported into New Zealand to weed out unfit deer. Wolves have never been imported into New Zealand, and there is none in the Dominion—except stuffed specimens in museums, and one or two perhaps in zoological gardens!

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London.
Jan. 22.

I acknowledge with regret that in the article entitled "Cultivation of the Unfit" contributed by me to Nature of January 11, I made a statement which I now find to be incorrect. I stated that when deer were introduced into New Zealand they multiplied very rapidly and produced many weakly and malformed specimens which had to be weeded out in order to keep up the standard of the herd, and that wolves were introduced to effect this. I find that the statement that wolves were introduced is incorrect, but I find also, on communicating with the New Zealand offices, that my argument in the article is not affected by this mistake. I quote some sentences in a letter sent me from the New Zealand Government Office.

"As you state, they [that is, the deer] were free from natural enemies and multiplied and spread at a very great rate and in many cases produced magnificent heads. . . . As you state, the great increase in the number of deer during recent years has been accompanied by a marked increase in the number of defective and weakly specimens. Endeavours were made by the various Acclimatization Societies to remedy this defect by paying hunters to shoot off the defective deer and I find in a book of reference on the subject that in the 1918–1919 season the Otago Acclimatization Society alone had a thousand head of deer shot off in one locality and a further six hundred and sixty-seven head in the same district in the following year."

So that in my article, if the words "wolves were introduced" are deleted and the words "hunters were paid" are substituted for them, the error, which I regret, will be eliminated.

E. W. M.