

down against the hot surface and stirred until a uniform glutinous mass is obtained. Then the proper weight of vaseline should be added, and the whole thoroughly stirred together.

This may be left on an air-pump plate for at any rate a couple of years without perceptible alteration either in itself or the brass.

Eton College

H. G. MADAN

Butterflies' Wings

CAN you inform me of any method of relaxing the wings of butterflies allowed to stiffen in the closed state?

Stretford, Manchester, July 1

J. M. B.

[If the butterflies are laid on damp sand under cover of a bell-glass or other air-tight covering they will soon relax so as to be fit for setting-out. A drop or two of carbolic acid on a sponge should be placed with them in order to prevent mouldiness.—ED.]

NOTE ON THE ABSORPTION SPECTRUM OF DIDYMIUM

IN a paper on "Radiant Matter Spectroscopy" (Part 2, Samarium),¹ I said that in fractionation of the didymium earths with ammonia—"After a time a balance seemed to be established between the affinities at work, when the earths would appear in the same proportion in the precipitate and in the solution. At this stage they were thrown down by ammonia, and the precipitated earths set aside to be worked up by the fusion of their anhydrous nitrates so as to alter the ratio between them, when fractionation by ammonia could be again employed."

That in most methods of fractionation a rough sort of balance of affinities beyond which further separation by the same method is difficult, appears to be a general rule. I have long noticed this action when fractionating with ammonia, with oxalic and nitric acids, and with formic acid. The valuable point which renders this fact noteworthy is that the balance of affinities revealed by fractionation is not the same with each method. It was in consequence of the experience gained in these different methods of fractionation that I wrote in my paper read before the Royal Society, June 10 last (*Chemical News*, vol. liv. p. 13), after saying that I had not been able to separate didymium into Dr. Auer's two earths, "probably didymium will be found to split up in more than one direction according to the method adopted."

In illustration of this I may mention that, although I have not split up didymium into the two earths, or groups of earths, which are described by Dr. Auer, other processes of fractionation give me, so to speak, other cleavage planes or lines of scission through the compound molecule didymium.

According to Dr. Auer, a line in the well-known yellow band, close to the soda line, but less refrangible (w.l. about 579), is a component of the absorption-spectrum of neodymium, and therefore, under all conditions, its intensity should follow the same variations as the other bands of neodymium in the blue (wave-lengths 482, 469, 444). Some of my didymium fractions, however, show that the line 579 does not follow the same law as the other bands I have named. Thus, in a rather low fraction (+6) of the didymium earths from gadolinite and samarskite I found that the neodymium line 579 was of the same degree of blackness as the adjacent praseodymium line in the yellow (wave-length about 571), but the bands in the blue of neodymium had almost disappeared. In the adjacent fractions of didymium I was enabled, by appropriate dilution, to keep this set of bands in the yellow as a standard, of exactly the same intensity; it was now seen that in successive fractions the intensities of the other more refrangible lines belonging both to neo-

and praseodymium varied greatly from strong to almost obliteration, the bands in the yellow always being kept of the same intensity.

Didymium prepared from a specimen of fluocerite differed somewhat from the other didymiums. Here the band 579 (ascribed to neodymium) was very strong, the band in the yellow of praseodymium (571) slightly weaker, and the bands in the blue of neodymium (482, 469, and 444) easily visible. On diluting the solution the bands in the blue of neodymium and the one component of praseodymium in the yellow (571) appeared to follow the same law in becoming fainter and fainter with dilution, whilst the other component band in the yellow of neodymium (579) remained unaffected.

It seems to me that a possible explanation of this variation might be founded on the great strength of the bands in the yellow, and that the two fractions of didymium then under examination might differ only in the fact that one was slightly stronger than the other. To test this hypothesis I took the two fractions first experimented on, and putting each into a wedge-shaped cell of glass viewed them together in the spectroscope. (1) I adjusted the wedges so that the group in the yellow appeared to be of the same intensity in each spectrum. On examining other parts of the spectrum it was seen that in one solution the bands in the green were tolerably strong, and the bands in the blue scarcely visible, whilst in the other solution the bands in the green were very faint, and those in the blue quite absent. (2) The position of the wedges was adjusted so that the bands in the green in each case should be of equal intensities. It was now seen that the alteration had greatly upset the balance of the bands in the yellow, the solution in which the bands in the green were faintest before, now having much stronger yellow bands than the other. The explanation mentioned above therefore falls through, and I see no other way of accounting for the facts except in the supposition that by the mode of fractionation then adopted, didymium had split up in a different manner to what it would have done if the method of Dr. Auer had been followed.

The colour of the different fractions of didymium nitrate varies from a dark rose-red at the more basic end (+17) to amber at the less basic end (+4). These variations in colour do not necessarily accompany a difference in the absorption-bands, for in one instance an amber and a rose-coloured salt were found to have almost identical spectra.

It would almost appear from these experiments, coupled with the facts I brought forward in last week's *Chemical News* (p. 14), that the "one band, one element" theory I lately advanced in connection with the phosphorescent spectrum of yttrium, may probably hold good in the case of the group of elements forming absorption spectra. According to this hypothesis, therefore, neodymium and praseodymium must not be considered as actual chemical elements, but only the names given to two groups of molecules into which the complex molecule didymium splits up by one particular method of fractionation.

WILLIAM CROOKES

HEATING AND COOKING BY GAS

A FEW years ago the public was led to believe that the use of coal-gas for lighting purposes was on its trial, and must shortly give way to the electric light. Threatened institutions live long, and even if coal-gas is destined to be eventually superseded by electricity for lighting purposes, a useful future is now opening out for it as a fuel offering many advantages over coal for domestic heating and cooking. In these fields it may possibly occur in the future that coal-gas—unless the price is everywhere considerably reduced—will have to encounter rivals such as the petroleum oils on the score of their cheapness, but at present, coal-gas, for cooking

¹ *Phil. Trans.*, Part 2, 1885, p. 706. A reprint of this paper is also commended in No. 1390 of the *Chemical News*, p. 28.