ON THE SPECTRA OF AZO-COLORS.

By J. H. STEBBINS, JR. (1st paper, April 1st,' 84.)

Much has already been done and said on the spectra of aniline and other dyestuffs, but up to the present time, I think nothing whatever has been done, bearing on the subject of azo-colors.

With the view, therefore, of throwing some light on this subject, and as a further means of distinguishing these colors, one from another, I have undertaken this investigation.

As the collecting of the different samples of dyestuffs is a somewhat troublesome matter, I shall only be able to read to you tonight the first part of my paper, reserving the second part, until the material on hand will enable me to proceed with it.

The spectroscope used in this investigation is a direct vision instrument, with micrometer scale, and comparison prism, manufactured by Dr. J. G. Hofmann, of Paris. It is a most excellent little piece of apparatus, and admirably suited for the study of absorption spectra.

The solutions examined were contained in wide mouthed, white glass, square bottles, having an inside diameter of $3\frac{1}{2}$ C. M. My method of mapping is very simple and will explain itself. On a Bunsen scale, I lay out the principal Frauenhofer lines, and by means of these and the scale figures locate the position of the spectra. The vertical lines give the intensity of absorption, and the horizontal lines the strength of the solutions. Then, by simply drawing a curve from the horizontal to the vertical lines, the position and intensity of absorption may be expressed.

The azo-colors which I have thus far examined, present no very striking features, there being no characteristic bands as in some other colors (cochineal for instance), but a mere cutting out, so to speak, of the green, blue and violet parts of the spectrum, which varies according to the strength and nature of the color.

The following is a list of the dyestuffs examined :

Orange II and IV, and Fast Red, from the firm of Pickhardt & Kutroff.

Tropaeolines Y O.; OOO N° 1; OOO N° 2.

Brown O, Brown N⁰ 1, and Chrysoidine, from the firm of Williams, Thomas & Dower.

Orange 2.

β-Naphtholeazobenzolesulphonate of soda.

$$C_6H_4\ (Na\ SO_3)—N{=}N--B—C_{10}\ H_6\ OH.$$

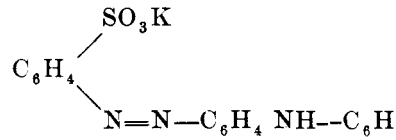
Dissolved 1 grm. of dyestuffs in 1 litre of water, and examined the spectrum.

It gave a band extending from 50—or D to 170. Region of maximum intensity D 54—H 170.

The same plus sulphuric acid produced no visible change.

Orange IV.

Diphenylamineazobenzolesulphonate of potash.



As this is a much stronger dyestuff than the foregoing, it was necessary to work with much more dilute solutions. ¼ grm. was dissolved in 1 litre and examined.

Absorption band ranges from D 60--H 170.

Region of maximum intensity D 62—H 170.

The same plus sulphuric acid gave a band ranging from C 42—H 170.

Region of maximum intensity D 54—H 170.

Fast Red, Roccelline, etc.

β-Naphtholeazonaphthaline sulpho-acid.

$$C_{10}\ H_6\ (HSO_3)—N{=}N—\beta\text{-}C_{10}\ H_6\ OH.$$

⅛ grm. was dissolved in 1 litre and examined.

Absorption band ranging from C 42—H 170.

Region of maximum intensity D 52—H 170.

Sulphuric acid produces no visible changes.

Tropaeoline Y.

Phenoleazobenzolesulphonate of soda.

$$C_6 H_4 (Na SO_3)—N=N—C_6 H_4 OH.$$

Dissolve ½ g. to 1 litre and examined the spectrum.
Absorption band ranging from E 70—H 170.
Region of maximum intensity E 50—H 170.
The same plus sulphuric acid gave a band from D 50—H 170.
Region of maximum intensity E 70—H 170.

Tropaeoline O. O. O. N° I, or Orange, N° 1.

α-Naphtholeazobenzolesulphonate of potash.

$$C_6 H_4 (KSO_3)—N=N—X—C_{10} H_6 OH.$$

½ grm. was dissolved to 1 litre and examined.
Absorption band runs from C 49—H 170.
Region of maximum intensity 54—170.
Sulphuric acid produces no change.

Tropaeoline O. O. O., N° 2.

Same as Orange N° 2.

Tropaeoline O.

Resorcineazobenzolesulphonate of soda.

$$C_6 H_4 (Na SO_3)—N=N—C_6 H_3 \begin{matrix} OH. \\ \diagup \\ \diagdown \\ OH. \end{matrix}$$

½ grm. was dissolved in 1 litre and examined.
Absorption band runs from D 65—H 170.
Region of maximum intensity E 70—H 170.
Sulphuric acid produces no change.

Brown O.

½ grm. was dissolved in 1 litre and examined.
Absorption band runs from D 52—H 170.
Region of maximum intensity D 66—H 170.
Sulphuric acid produces a band ranging from C 48—H 170.
Region of greatest intensity D 54—H170.

Brown N° 1.

½ grm. was dissolved in 1 litre and examined.
Absorption band ranges from C 40—H 170.
Region of greatest intensity C 44—H 170.
Sulphuric acid seems to produce no change.

Chrysoïdine.

Diamidoazobenzole.

$$C_6 H_5\text{--}N{=}N\text{—}C_6 H_3 (NH_2)_2$$

½ grm. was dissolved in 1 litre and examined.
Absorption band ranges from D 50—H 170.
Point of maximum intensity D 60—H 170.
Sulphuric acid produced no change.

Some of the above spectra resemble one another so strikingly that I fear it would be a difficult task to distinguish them and much more so to estimate them quantitatively. Nevertheless in my next paper I will describe a number of other spectra, together with some attempts at quantitative spectrum analysis, using standard color solutions of known strength.