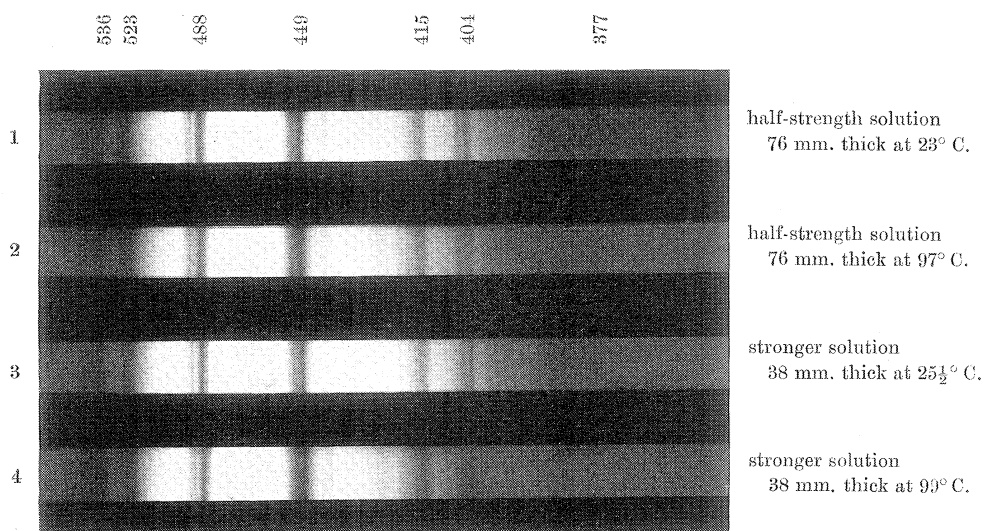


PLATE 13.

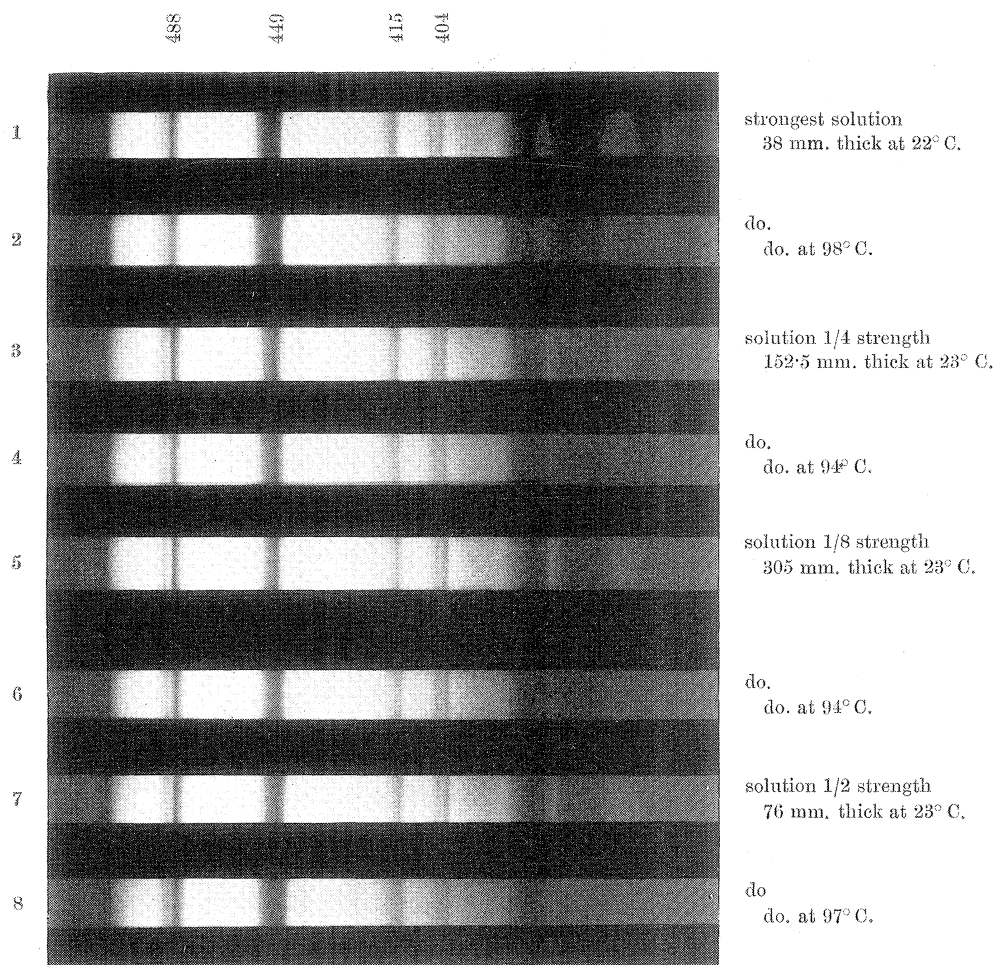
Absorptions by solution of erbium chloride, cold and hot alternately, in two degrees of concentration.



The extension of the general absorption at the more refrangible end of the spectrum by a rise of temperature is manifest in these photographs, and so is the greater diffuseness of the bands at about $\lambda 449$ and $\lambda 488$.

PLATE 14.

Absorptions by solutions of erbium nitrate, cold and hot alternately, in four degrees of dilution, in thicknesses inversely as the dilutions. The strongest solution had 566 grams of erbium nitrate per litre.

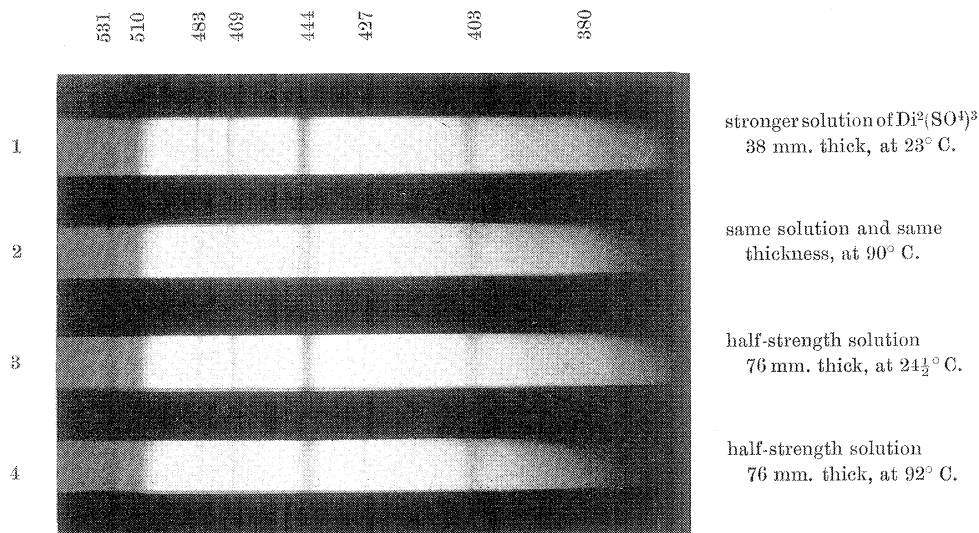


It will be noticed that the effect of heating the solution is in general to render the absorption bands more diffuse, and that it is the bands that increase in diffuseness with increasing concentration of the solution which are most affected by the rise of temperature.

The original photographs shew several fainter bands which have not come out in the reproduction, and also shew the lighter interspaces between the absorptions in the ultra violet much more distinctly than the reproduction. Even in the reproduction these lighter interspaces in the ultra violet are more distinct in the spectra of the cold solutions than in those of the hot solutions.

PLATE 15.

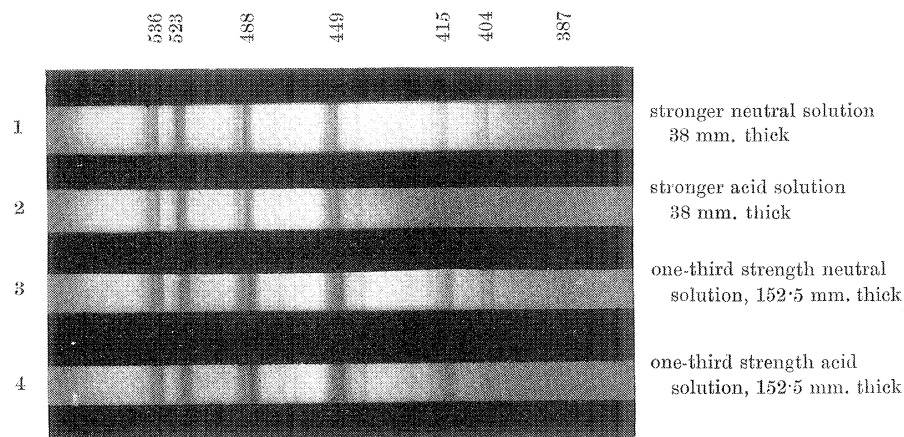
Absorptions by solution of didymium sulphate, cold and hot, in two degrees of concentration. The stronger solution was a saturated solution at 20° C.



The extension of the general absorption at the more refrangible end of the spectrum, and the increased diffuseness of the bands in the blue, by the rise of temperature is plainly seen in these photographs.

PLATE 16.

Absorptions by solution of erbium chloride, neutral and acid, in two degrees of concentration; the stronger neutral solution having 726.6 grams of the chloride to the litre, and the acid solution having besides an amount of hydrochloric acid equivalent to the amount of neutral salt.

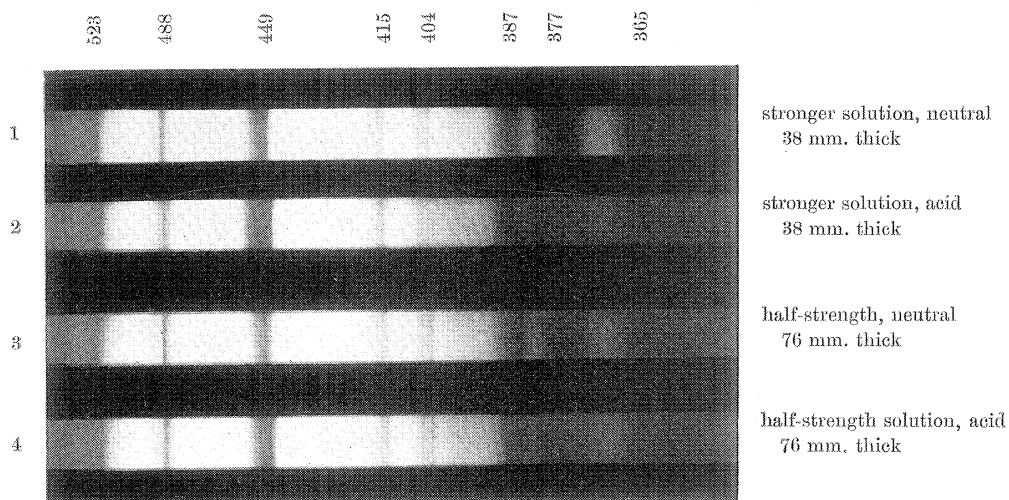


The thickness of the absorbent solutions is not proportional to the dilutions, so that the absorptions of figures 3 and 4 are produced by a quantity of salt one-third greater than that which gave figures 1 and 2, which makes the bands of 3 and 4 stronger.

The effect of the acid is chiefly to extend the general absorption at the more refrangible end of the spectrum.

PLATE 17.

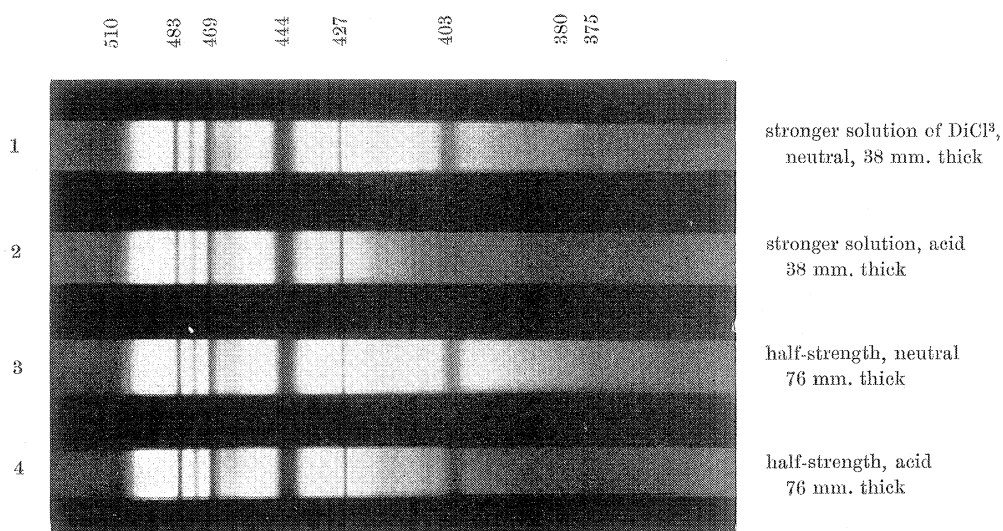
Absorptions by solutions of erbium nitrate, neutral and acid, in two degrees of concentration. The stronger neutral solution had 935.2 grams of the salt per litre, and the acid solution had in it besides as much nitric acid as was equivalent to the amount of neutral salt.



The effect of the acid in rendering the bands more diffuse is seen in these photographs, and in the extension of the general absorption at the more refrangible end of the second figure.

PLATE 18.

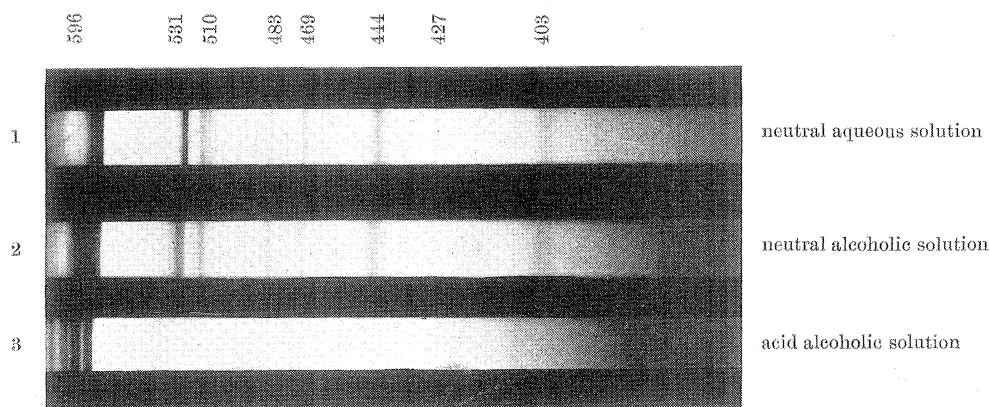
Absorptions by solutions of didymium chloride, neutral and acid, in two degrees of concentration: the acid solutions containing the same amount of didymium per litre as the neutral solutions but with hydrochloric acid in addition.



The chief effect of the acid is to extend the general absorption at the more refrangible end of the spectrum.

PLATE 19.

Absorptions by nearly equivalent solutions of didymium chloride in water, in alcohol, and in alcohol charged with hydrochloric acid. The acid solution was prepared from the neutral alcoholic solution by passing hydrochloric acid gas into it and was found to be about nine-tenths of the strength in didymium of the neutral solution.



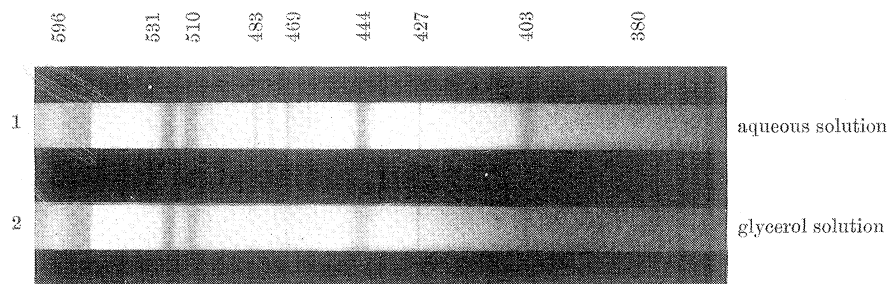
The general absorption at the more refrangible end is extended a little by the alcohol, and still more by the addition of acid.

The bands are generally rendered more diffuse by alcohol and a little shifted towards the red end of the spectrum, the shift increasing as the refrangibility decreases.

The acid seems to diffuse away the bands in the blue, the strong pair at about $\lambda 520$ are just visible in the spectrum of the acid solution considerably shifted towards the red. And the strong group in the yellow is still more shifted, and so spread out that several of the component bands are separated.

PLATE 20.

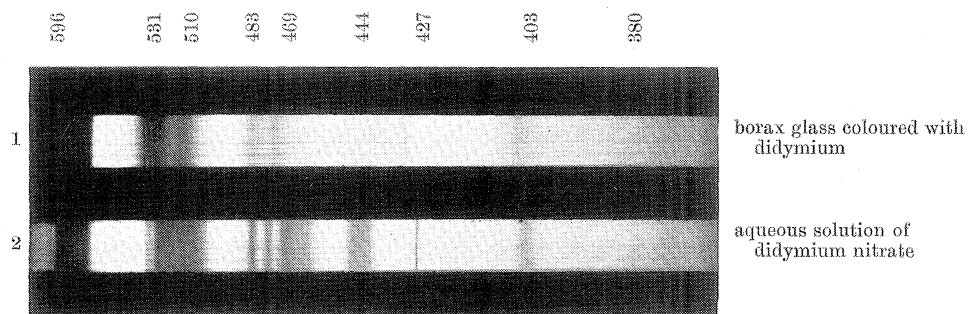
Absorptions by equivalent solutions of didymium nitrate in water and in glycerol.



No definite shift of the bands by the glycerol appears in the photograph, but there is an extension of the general absorption at the more refrangible end of the spectrum, and the bands are rendered more diffuse by the glycerol.

PLATE 21.

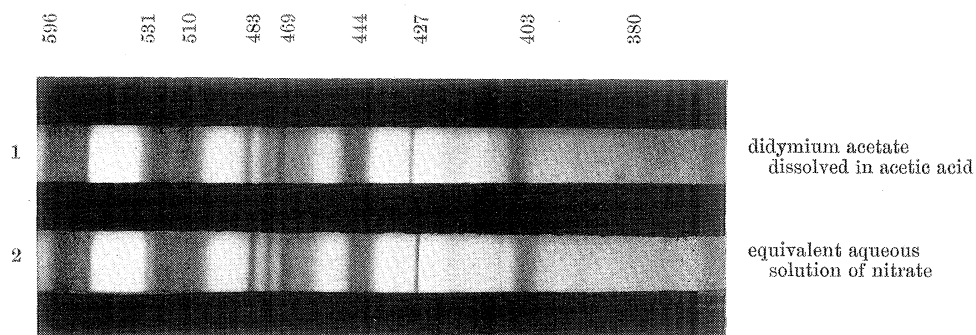
Absorptions by glass of borax coloured with didymium oxide and by a solution in water of didymium nitrate containing a quantity of didymium equal to that in the glass.



These photographs are disfigured with horizontal lines due to dust on the slit of the spectroscope. It will be seen that the bands are for the most part shifted by the borax but very unequally so; also that the bands are rendered more diffuse by the borax and some almost diffused away.

PLATE 22.

Absorptions by equivalent solutions of didymium acetate in acetic acid and of didymium nitrate in water.

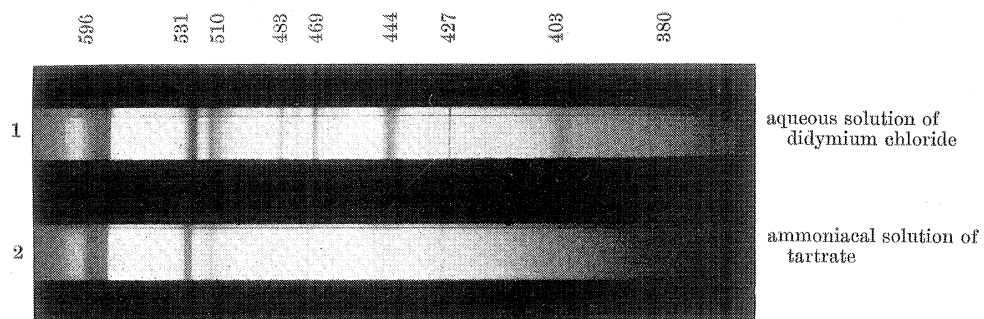


The bands are generally shifted towards the red by the acetic acid, and in the photograph the shift diminishes as the band is less refrangible; but the dispersion of the spectroscope also diminishes as the light is less refrangible; so the apparent diminution of the shift is not altogether real.

The acetic acid also increases the diffuseness of the bands, as is very manifest in the case of the band at about $\lambda 476$, and may be traced in others.

PLATE 23.

Absorptions by solutions of didymium chloride in water, and of didymium tartrate in water charged with ammonia.



The tartrate has all its bands more diffuse than the chloride, some of them almost diffused away, and they are shifted towards the red.

