ON THE IDENTIFICATION OF THE COAL-TAR COLOURS.*

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DYERS and others who are in the habit of using the coal-tar colours are familiar with a number of chemical reactions by which the members of the series may generally be classified and identified. Differences are remarked in their relative affinities for various sorts of fibres, some colours being taken up freely by silk, others fixing better upon wool, and some few, like saffranin, exhibiting a special affinity for cotton. Again, as with the yellows, great differences are observed when the operator proceeds to work with a free acid or a weak alkali in the dye-bath. Primrose (naphthaline yellow) requiring the former, but not so with phosphorine (crysaniline yellow), which demands a neutral or even slightly alkaline bath.

By the study of these conditions, aided by a few characteristic tests, it is often possible to identify colouring matters of unknown or doubtful origin, and it is with the view of extending the number of such readily available tests that I recommend a more frequent appeal to the colour reactions with sulphuric acid.

For this purpose but small quantities of material are required, a few grains serving to impart a distinct colour to a comparatively large bulk of sulphuric acid, and the resulting indications are in many cases both specific and permanent. Oil of vitriol, which so readily destroys nearly all organic structures, does not carbonise any of the coal-tar colours, or does so only under severe conditions, as at high degrees of heat. Even indigo and madder, although of true vegetable origin, are known to yield up their colouring-matters to sulphuric acid, the old process of dyeing depending upon this fact. In the manufacture of garancine from madder the woody fibre and organised tissues are destroyed by the action of sulphuric acid, whilst the alizarin glucoside survives, and with it Turkey-red goods may be dyed.† Instances might be multiplied as proof that colouring-matters, both natural and artificial, resist the attack of oil of vitriol, and the large class of sulphonates (Nicholson blues, "acid roseine," &c.) may be cited as establishing the fact that colouring-matters are not so destroyed, but form combinations with sulphuric acid.

If, then, the body under examination be dissolved in strong oil of vitriol, a colour-test is at hand whereby useful inferences may be derived as to the nature of the dye, and often its exact identity disclosed. A few direct confirmatory tests may then be applied. The most remarkable colour reactions are the following :—

Magdala (naphthaline pink).....	Blue-black.
Saffranin.....	Grass-green, becoming indigo-blue on strongly heating.
Crysödin.....	Deep orange, turning almost to scarlet on heating.
Alizarin	Ruby-red or maroon.
Eosin	Golden yellow.
Primrose (naphthaline yellow).....	Difficultly soluble, first yellow, and colour discharged on heating.
Crysaniline	Yellow or brown solution, of marked fluorescent character.
Aurin	Yellowish brown, non-fluorescent.
Atlas orange	Rose colour, turning to scarlet on heating.
Atlas scarlet	Scarlet solution, very permanent on heating.

* Read before the Chemical Section of the British Association, Swansea Meeting.

† See W. H. Perkin's "History of Alizarin," *Journ. Society of Arts*, May, 1879.

Biebrich scarlet, R.	Blue-black or deep purple.
" " B.	Bluish green.
Aniline scarlet	Golden yellow, permanent on heating.
Indulin	Slatey blue to indigo, according to shade of the dye.
Rosaniline, regina, and all violets	Yellow or brownish yellow.
Phenyl and diphenylamine blues	Dark brown solutions.
Iodine green.....	Bright yellow solutions, the former giving off iodine on heating.
Malachite green	
Citronine	Pale cinnamon or neutral tint.

After vitriol the action of concentrated hydrochloric acid may be next tried, which distinguishes at once between saffranin and Biebrich scarlet, the former giving a violet solution and the latter being precipitated as a red flocculent powder.

Proceeding in this way, and combining the observation with the dyer's usual test, every one of the substances named can be readily identified, and much time saved in the examination of dye-stuffs.