

Approximate Determination of the Solubility of Leather Dyes

1 Purpose and Scope

- 1.1 By solubility of leather dyes is meant the amount of dye in grammes per litre of distilled water, which just remains in solution at a particular temperature.
- 1.2 This method is valid for the determination of the solubility at 60 °C and 20 °C.

2 Principle

- 2.1 The determination of the solubility is carried out as a spot test. The principle of this depends on making visible any dye insoluble in a solution of defined concentration. Drops of dye solution are placed on filter paper, complete solubility being indicated by a spot of more or less uniform colour. Insoluble dye, however, appears either as a finely divided precipitate distributed over the whole spot or it may separate at the centre or as a ring near the edge. The limit of solubility at 60 °C or 20 °C, respectively, is taken as the highest concentration which leaves no visible precipitate or does not give a clearly increased intensity of colour at the centre.

3 Apparatus

- 3.1 **Filter paper** - Filter paper equivalent in quality and porosity to Schleicher and Schüll No 604 and Whatman No 4 is stretched evenly over a frame. One of wood about 20 cm x 30 cm is suitable.
- 3.2 **Dropping pipette** - Glass capillary, 25 cm long, 7 mm od, 2 mm id, delivery end ground flat.

4 Procedure

- 4.1 Prepare a series of concentrations with 5, 10, 15, 20, 25, 30, 40, 50, 75 and 100 g of dye per litre of distilled water by dissolving the correct amount of dye, weighed to the nearest 0.1 g in 100 ml water (see also Section 6.1). Where no special directions are given, for dissolving the dye, pour 100 ml water on it at room temperature, cover with watch glass, boil up, and boil gently for 2 minutes. Cool with constant stirring to 60 ± 2 °C.
- 4.2 Warm the pipette for at least 10 minutes in distilled water at 60 ± 2 °C. Draw in dye solution and allow to empty four times. Fill a fifth time and dry outside and delivery end with cotton wool. Allow one drop of the dye solution to fall on the filter paper from a height of about 1 cm.
- 4.3 Return the pipette and its contents to the remaining dye solution and cool this to 20 ± 2 °C with constant stirring. Repeat the dropping procedure at this temperature immediately and, if required, after 2 hours.
- 4.4 **Assessment** - Assess the spots on the filter papers after drying at room temperature. The limit of solubility is taken as the highest concentration of dye solution which leaves no precipitate or does not give a clearly increased intensity of colour at the centre (see Section 6.2). The solubility is reported in grammes per litre of water in the above steps and refers to a temperature of 60 °C and 20 °C.

5 Report

This should comprise:

- 5.1 Name of dye and Colour Index designation (see Section 6.5).
- 5.2 Reference to the present method.
- 5.3 Details of any deviations from the procedure including special directions followed for dissolving the dye, if any.
- 5.4 The solubility of the dye at 60 °C and 20 °C in grammes per litre of water in the steps given above.

6 Notes

- 6.1 The series of concentrations can be shortened by a preliminary determination of the approximate limit of solubility. To do this it is recommended to use a concentration of 40 g/l of water. If the limit appears to lie above this, the determination is restricted to the three higher concentrations and 10 g/l. If it lies lower, the solution may be diluted for further examination, for example, by 1:1.
- 6.2 Very dark spots must be examined under a lens.
- 6.3 For assessing the limit of solubility, it is helpful to prepare for comparison a spot obtained with 300 g/l of dye to illustrate how the dye appears when it is clearly above the solubility limit.
- 6.4 Dyes which gelatinise or have poor solubility are to be tested at that temperature at which they are just in solution.
- 6.5 The filter papers spotted according to this procedure may be used simultaneously for determining the stability to acid of the dye solution (see IUF 203).
- 6.6 If there is no Colour Index designation, state dyeing and chemical class.