

SCHEDULE

Regulations 5, 6 and 7

FORMULATIONS FOR THE CLASSES OF DENATURED  
ALCOHOL, STANDARDS AND OTHER RELATED PROVISIONS

*Formulation for completely denatured alcohol*

1. Completely denatured alcohol must be made in accordance with the following formulation: with every 90 parts by volume of alcohol mix 9.5 parts by volume of wood naphtha or a substitute for wood naphtha and 0.5 parts by volume of crude pyridine, and to the resulting mixture add mineral naphtha (petroleum oil) in the proportion of 3.75 litres to every 1000 litres of the mixture and synthetic organic dyestuff (methyl violet) in the proportion of 1.5 grammes to every 1000 litres of the mixture.

*Formulation for industrial denatured alcohol*

2. Industrial denatured alcohol must be made in accordance with the following formulation: with every 95 parts by volume of alcohol mix 5 parts by volume of wood naphtha or of a substitute for wood naphtha. Where a substitute for wood naphtha is used, the volume mixed with every 95 parts of alcohol may be less than 5 parts if—

- (a) the proportion of the marker in the resulting mixture is—
  - (i) in the case of methyl alcohol, not less than 36 parts per thousand,
  - (ii) in the case of tertiary butyl alcohol, not less than one part per thousand, or
  - (iii) in the case of another marker approved by the Commissioners, not less than the proportion specified by the Commissioners when they approved that marker, and
- (b) the resulting mixture contains the other substances that the Commissioners approved when they approved the substitute for wood naphtha in the proportions that they specify.

*Formulations for trade specific denatured alcohol*

3. Except in cases where the Commissioners approve an alternative formulation, trade specific denatured alcohol must be made in accordance with one of the following formulations—

- (a) with every 999 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix 1 part by volume of tertiary butyl alcohol, and to the resulting mixture add denatonium benzoate (of the description specified in paragraph 4) in the proportion of 10 micrograms per millilitre;
- (b) with every 979 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 20 parts by volume of cyclohexane and 1 part by volume of isopropyl alcohol;
- (c) with every 979 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 20 parts by volume of ethyl acetate and 1 part by volume of isopropyl alcohol;
- (d) with every 975 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 20 parts by volume of methyl alcohol and 5 parts by volume of hexane;
- (e) with every 950 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 50 parts by volume of benzyl benzoate;
- (f) with every 980 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 20 parts by volume of isopropyl alcohol, and to the

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resulting mixture add denatonium benzoate (of the description specified in paragraph 4), in the proportion of 10 micrograms per millilitre;

- (g) with every 950 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix not less than 50 parts by volume of isopropyl alcohol;
- (h) with every 990 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix 10 parts by volume of methylethylketone (consisting of 95 to 96 per cent by weight of methylethylketone, 2.5 to 3 per cent by weight of methylisopropylketone, and 1.5 to 2 per cent by weight of ethylisoamylketone), and to the resulting mixture add 1 gram of denatonium benzoate (of the description specified in paragraph 4);
- (i) with every 990 parts by volume of alcohol (of a strength of not less than 85 per cent alcohol by volume) mix 10 parts by volume of methyl alcohol and to the resulting mixture add denatonium benzoate (of the description specified in paragraph 4) in the proportion of 10 micrograms per millilitre.

#### *Denatonium benzoate*

4. Denatonium benzoate (mentioned in paragraph 3, and in paragraph 6) is benzyldiethyl [(2,6-xylycarbamoyl) methyl] ammonium benzoate.

#### *Use of water*

5. When making denatured alcohol in accordance with a formulation specified in paragraph 1, 2 or 3, water may be mixed with the alcohol before denaturing or with the denatured alcohol but the quantity of water added must not reduce the proportion or quantity of denaturing substances or dyes in the resulting mixture below the proportions or quantities specified in the formulation; and for the purpose of ascertaining the proportion or quantity of denaturing substances or dyes in any such mixture the water shall be treated as if it were alcohol.

#### *Standards for wood naphtha, other denaturing substances and dyes.*

6. Wood naphtha, substitute for wood naphtha, crude pyridine, mineral naphtha, tertiary butyl alcohol, denatonium benzoate, and dyes used in making denatured alcohol must conform to the respective standards and meet other respective requirements of paragraphs 7 to 11.

#### *Wood naphtha, and substitute for wood naphtha*

7.—(1) Wood naphtha must, to the satisfaction of the Commissioners, possess such properties as to render a mixture of one part of the naphtha with 19 parts of alcohol of a strength of not less than 95 per cent alcohol by volume unfit for human consumption.

- (2) Wood naphtha must contain not less than 72 per cent by volume of methyl alcohol.
- (3) In the case of a substitute for wood naphtha—
  - (a) the substitute must possess, to the satisfaction of the Commissioners, such properties as to render a mixture of one part of the substitute with 19 parts of alcohol, of a strength of not less than 95 per cent alcohol by volume, unfit for human consumption,
  - (b) all the ingredients and their amounts which are to constitute the substitute must be approved by the Commissioners, and
  - (c) the substitute must contain as a marker—
    - (i) not less than 72 per cent by volume of methyl alcohol, or
    - (ii) 2 per cent by volume of tertiary butyl alcohol, or

- (iii) such other marker as may be approved by the Commissioners in the proportions specified by them.

#### *Crude pyridine*

8.—(1) Crude pyridine must consist of pyridine bases and must not be more deeply coloured than a mixture of 2 millilitres of 0.05 molar iodine with one litre of water.

(2) It must mix readily and completely with alcohol of a strength of not less than 95 per cent alcohol by volume and must give a clear or only slightly opalescent solution when mixed with twice its volume of water.

(3) 10 millilitres of a 1 per cent solution in water must produce immediately a distinct crystalline precipitate on vigorous shaking after the addition of 5 millilitres of an aqueous solution of cadmium chloride containing 5 grammes of the anhydrous fused salt in 100 millilitres, and produce an abundant separation of crystals within 10 minutes.

(4) A white precipitate must be formed when 10 millilitres of a 1 per cent solution in water are mixed with 5 millilitres of Nessler's reagent.

(5) 1 millilitre of crude pyridine dissolved in 10 millilitres of distilled water must require not less than 9.5 millilitres of 0.5 molar sulphuric acid for neutralisation using screened methyl orange as an indicator.

(6) 100 millilitres distilled in accordance with *Determination of distillation characteristics of volatile organic liquids* (IP 195/98(2004))(BS 2000-195:1998) must give a distillate of at least 50 millilitres at a temperature of 140°C and of 90 millilitres at 160°C.

#### *Mineral naphtha (petroleum oil)*

9. Mineral naphtha (petroleum oil) must be of a specific gravity of not less than 0.800 at a temperature of 15.5°C and must possess the characteristic odour and taste of commercial paraffin oil used for burning purposes.

#### *Methyl violet dye (Colour Index Constitution No. 42555)*

10. Methyl violet dye must be in the form of small crystals readily and completely soluble in alcohol of a strength of not less than 95 per cent alcohol by volume.

#### *Quality*

11. All substances used in the production of denatured alcohol must be of sufficient quality to ensure that the alcohol is properly denatured.

#### *Notes:*

(1) The reference in paragraph 8(6) to *Determination of distillation characteristics of volatile organic liquids* is a reference to the standard test method published by the Energy Institute (IP 195/98(2004)) and is identical to British Standard BS 2000-195:1998 (effective from 15 February 2000).

(2) The reference to *Colour Index Constitution No. 42555* in the heading to paragraph 10 is a reference to the colour described as "C.I. Basic Violet 3 (Bright bluish violet)" and numbered 42555 in Part 2 of the index published by the Society of Dyers and Colourists in association with the American Association of Textile Chemists and Colourists (Part 2 of the 4th edition published in the United Kingdom in January 2002).