

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 2001.7—2005

Methods of test for textiles

Method 7: Quantitative analysis of fibre mixtures (BS 4407:1988, MOD)

RECONFIRMATION NOTICE

Technical Committee TX-020 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

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Council of Textile and Fashion Industries of Australia
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National Association of Testing Authorities Australia
RMIT University
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NOTES

Australian Standard™

Methods of test for textiles

Method 7: Quantitative analysis of fibre mixtures (BS 4407:1988, MOD)

PREFACE

This Standard was prepared by the Standards Australia Committee TX-020, Testing of Textiles to supersede the following series of test methods:

AS

2001	Methods of test for textiles
2001.7	Part 7: Quantitative analysis of fibre mixtures
2001.7.1—1983	Method 7.1: Test samples and test specimens
2001.7.2—1983	Method 7.2: General requirements
2001.7.3—1983	Method 7.3: Manual separation
2001.7.4—1983	Method 7.4: Binary mixture of acetate and certain other fibres (method using acetone)
2001.7.5—1983	Method 7.5: Binary mixtures of certain protein fibres (wool, animal hair, silk or protein) and certain other fibres (method using alkaline sodium hypochlorite)
2001.7.6—1983	Method 7.6: Binary mixtures of viscose, cupro or certain types of polynosic (modal) and cotton fibres (method using formic acid and zinc chloride)
2001.7.7—1983	Method 7.7: Binary mixtures of nylon 6 or nylon 6.6 and certain other fibres (method using formic acid 80% <i>m/m</i>)
2001.7.8—1983	Method 7.8: Binary mixtures of acetate and triacetate fibres (method using benzyl alcohol)
2001.7.9—1983	Method 7.9: Binary mixtures of triacetate and certain other fibres (method using dichloromethane)
2001.7.10—1983	Method 7.10: Binary mixtures of certain cellulose fibres and polyester (method using sulphuric acid 75% <i>m/m</i>)
2001.7.11—1983	Method 7.11: Binary mixtures of acrylics, certain modacrylics or certain chlorofibres (method using dimethylformide)
2001.7.12—1983	Method 7.12: Binary mixtures of chlorofibres and certain other fibres (method using carbon disulphide/acetone 55.5/44.5)
2001.7.13—1983	Method 7.13: Binary mixtures of acetate and certain chlorofibres (method using glacial acetic acid)
2001.7.14—1983	Method 7.14: Binary mixtures of silk and wool or hair fibres (method using sulphuric acid 75% <i>m/m</i>)
2001.7.15—1983	Method 7.15: Binary mixtures of certain cellulose fibres and wool or hair (method using sulphuric acid 70% <i>m/m</i>)
2001.7.16—1983	Method 7.16: Binary mixtures of jute and certain animal fibres (method of determining the nitrogen content)
2001.7.18—1983	Method 7.18: Binary mixtures of polyolefin and certain other fibres (method using xylene)
2001.7.19—1990	Method 7.19: Binary mixtures of chlorofibres (homopolymers of vinyl chloride) and certain other fibres (method using concentrated sulfuric acid)

2001.7.20—1983 Method 7.20: Binary mixtures of inorganic based, man-made fibres and certain fibres (method based on ignition at 625°C)

This Standard is an adoption with national modifications and has been reproduced from BS 4407:1988, *Methods for quantitative analysis of fibre mixtures* and its amendments, 6297:1990 and 9438:1997 which have been incorporated into the source document. The 1997 amendments are indicated by marginal bars.

The objective of this Standard is to provide manufacturers and testing bodies with a standard method for quantifying and identifying binary and ternary textile fibre mixtures.

For the purpose of this Standard, a supplementary method currently used in Australia, but not included in BS 4407, has been included as set out in Appendix ZZ. This method is for the determination of binary mixtures of cellulose and wool or hair fibres using sulphuric acid 70% *m/m* and is identified as Method 19.

As this Standard is reproduced from a British Standard, the following applies:

- (a) Its number appears on the cover and title page while the British Standard number appears only on the cover.
- (b) The source text ‘this British Standard’ should read ‘this Australian Standard’.

None of the documents referenced in this Standard have been adopted as Australian Standards.

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Section 1. General

1 Scope

This British Standard describes methods for the quantitative analysis of textile fibre mixtures after identification of the fibre components of the mixture, including the composition of the individual yarns. Any non-fibrous matter is removed by a suitable pretreatment. If the fibre components do not form an intimate mixture and can be readily separated by hand, the analysis is carried out by the procedure given in section 3.

If part or the whole of the textile consists of an intimate mixture of two fibre types (binary mixture) one of the components is removed using a suitable method²⁾ following the appropriate procedure given in section 4, and the proportion of this component is calculated from the loss in mass. Wherever possible it is preferable to remove the fibre present in greater proportion, thus obtaining the fibre present in the smaller proportion as residue.

If part or the whole of the textile consists of an intimate mixture of three fibre types (ternary mixture) the above process is repeated using a second reagent. Suitable methods for the analysis of specific ternary mixtures are given in Appendix A.

NOTE 1 To obtain a reliable result, at least two determination should be made, either by manual separation or by chemical separation, if the results of duplicate tests differ by more than 2 %, two repeat determinations should be made.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the definition given in BS 4815 apply.

²⁾ Method 13 is an exception. It is based on a determination of the content of a constituent element of one of the two component

Section 2. Information common to the methods given for the quantitative analysis of fibre mixtures

3 Apparatus

3.1 *Glass-filter crucibles*, with sealed-in sintered disc filters of porosity grade P160 complying with BS 1752 and provided with either ground-glass stoppers or watch glass covers.

3.2 *Soxhlet extractor*, complying with BS 2071.

3.3 *Weighing bottles*.

3.4 *Ventilated oven* for drying specimens at $105 \pm 3^\circ\text{C}$.

3.5 *Desiccator* containing self-indicating silica gel.

3.6 *Analytical balance*, accurate to $\pm 0.0002\text{ g}$.

3.7 *Vacuum flask*.

3.8 *Additional apparatus* as specified in the appropriate clauses of this standard.

4 Reagents

4.1 *Light petroleum*, redistilled, boiling range 40°C to 60°C .

4.2 *Water* complying with grade 3 of BS 3978.

4.3 *Other reagents* as specified in the appropriate clauses of this standard.

5 Conditioning and testing atmosphere

Dry masses are determined and therefore it is unnecessary to condition the specimen. The analysis is carried out under ordinary room conditions.

6 Sample

Take a sample that is representative of the bulk and sufficient to provide all the specimens, each of at least 1 g, that are required. Follow the sampling procedure as described in BS 4658.

7 Pretreatment of sample

Extract the air-dry sample in a soxhlet apparatus (3.2) with light petroleum for 1 h at a minimum rate of 6 cycles/hour. Allow the light petroleum (4.1) to evaporate from the sample. Then extract it by immersing the sample in water at room temperature for 1 h and then immersing it in water at $65 \pm 5^\circ\text{C}$ for a further hour, agitating the liquor from time to time. Use a liquor to sample ratio of 100 : 1.

Where non-fibrous matter, e.g. size or special finish, cannot be extracted with light petroleum and water, remove it by substituting for the water treatment described above, a suitable method that does not substantially alter any of the fibre constituents. However, for some unbleached, natural vegetable fibres (e.g. jute, coir) note that normal pretreatment with light petroleum and water does not remove all the natural non-fibrous substances. Do not apply additional pretreatment unless the sample does contain finishes insoluble in both light petroleum and water. Include full details of the methods of pretreatment used in the analysis report.

8 Test procedure

8.1 General instructions

8.1.1 *Drying*. Conduct all drying operations for not less than 4 h and not more than 16 h at $105 \pm 3^\circ\text{C}$ in a ventilated oven with the oven door closed throughout. If the drying period is less than 14 h, weigh the specimen or residue to check that its mass has become constant. The mass may be considered to have become constant if, after a further drying of 60 min, its variation is less than 0.05 %. Where apparatus other than a filter crucible is used, conduct drying operations in the oven in such a way as to enable the dry mass of the fibres to be determined without loss of fibre.

8.1.2 *Drying of specimen*. Dry the specimen in a weighing bottle with its stopper beside it. After drying, stopper the weighing bottle before removing it from the oven and transfer it quickly to a desiccator.

8.1.3 *Drying residue*. Dry the residue in the filter crucible with its stopper or cover beside it. After drying, close the crucible and transfer it quickly to a desiccator.

8.1.4 *Cooling*. Conduct all cooling operations in the desiccator, the latter being placed beside the balance, until complete cooling of the weighing bottles is attained, and in any case for not less than 2 h.

8.1.5 *Weighing*. After cooling, complete the weighing of the weighing bottle or crucible within 2 min of its removal from the desiccator.

NOTE Do not handle the crucibles, weighing bottles, specimens or residues with bare hands during the drying, cooling and weighing operations.

8.2 Procedure

Take from the pretreated sample a test specimen weighing at least 1 g. Cut yarn or dissected fabric into lengths of about 10 mm. Dry the specimen in a weighing bottle, cool it in a desiccator and weigh it (see 8.1.2, 8.1.4 and 8.1.5). Transfer the specimen to the glass vessel specified in the appropriate method, reweigh the weighing bottle immediately and obtain the dry mass of the specimen by difference.

Except in the case of method 13, complete the test procedure as specified in the appropriate clause of the standard and examine the residue microscopically to check that the treatment has completely removed the soluble fibre.

9 Calculation and expression of results

9.1 Two-component mixtures

9.1.1 Express the mass of the insoluble component as a percentage of the total mass of fibre in the mixture. Calculate the results on a clean dry mass basis as in 9.1.2 or on clean dry mass with agreed allowances for moisture and other matter and also allowances, where appropriate, for non-fibrous matter removed in the pretreatment as in 9.1.3.

Obtain the percentage of the soluble component by difference.

9.1.2 Determine the percentage of clean dry insoluble component as follows:

$$P_1 = \frac{100rd}{m} (\%)$$

where

- P_1 is the percentage of clean dry insoluble component;
- m is the dry mass of the specimen (g);
- r is the dry mass of the residue (g);
- d is the correction factor for loss in mass of the insoluble component in the reagent. (Suitable values of d are given in the appropriate clauses of this standard.)

9.1.3 Determine the percentage of clean insoluble component in the mixture with agreed allowances for moisture and other matter and also allowances for non-fibrous matter removed in pretreatment, as follows:

$$P_1A = \frac{100P_1 \left(1 + \frac{a_1 + b_1}{100}\right)}{P_1 \left(1 + \frac{a_1 + b_1}{100}\right) + (100 - P_1) \left(1 + \frac{a_2 + b_2}{100}\right)} (\%)$$

where

P_1A is the percentage of clean insoluble component in the mixture with agreed allowances for moisture and other matter and also, where appropriate, allowances for non-fibrous matter removed in the pretreatment;

P_1 is the percentage of clean dry insoluble component as calculated in 9.1.2;

a_1 is the agreed allowance added to the insoluble component for moisture and other matter [see Appendix B (%)];

a_2 is the agreed allowance added to the soluble component for moisture and other matter [see Appendix B (%)];

b_1 is the percentage loss of insoluble component caused by the pretreatment (%);

b_2 is the percentage loss of soluble component caused by the pretreatment (%);

The percentage of the second component (P_2A is equal to $(100 - P_1A)$).

Where a special pretreatment has been used the values b_1 and b_2 should be determined, if possible, by submitting each of the pure fibre constituents to the pretreatment applied in the analysis. Pure fibres are those free from all non-fibrous material except those which they normally contain (either naturally or because of the manufacturing process) in the state (unbleached, bleached) in which they are found in the material to be analysed.

Where no clean separate constituent fibres used in the manufacture of the material to be analysed are available, average values of b_1 and b_2 , as obtained from tests performed on clean fibres similar to those in the mixture under examination, shall be adopted.

If normal pretreatment by extraction with light petroleum and water is applied, b_1 and b_2 may generally be ignored except in the case of unbleached cotton, unbleached flax and unbleached hemp where the loss due to the pretreatment is usually accepted as 4 %, and in the case of polypropylene as 1 %.

In the case of other fibres, losses in the pretreatment are usually disregarded in calculation.

9.2 Three-component mixtures

9.2.1 General. Express the mass of each component as a percentage of the total mass of the fibres in the mixture. Calculate on a clean dry mass basis as given in 9.2.2, 9.2.3, 9.2.4, 9.2.5 (see Appendix A, variants 1 to 4) or on a clean dry mass with agreed allowances for moisture and other matter and also, where appropriate, allowances for non-fibrous matter removed in the pretreatment, as given in 9.3.

9.2.2 Variant 1. Formulae to be applied where a component of the mixture is removed from one specimen and another component from a second specimen.

$$P_1 = 100 \left[\left\{ \frac{d_2}{d_1} - \left(\frac{d_2 r_1}{m_1} \right) \right\} + \left\{ \frac{r_2}{m_2} \left(1 - \frac{d_2}{d_1} \right) \right\} \right] \quad (\%)$$

$$P_2 = 100 \left[\left\{ \frac{d_4}{d_3} - \left(\frac{d_4 r_2}{m_2} \right) \right\} + \left\{ \frac{r_1}{m_1} \left(1 - \frac{d_4}{d_3} \right) \right\} \right] \quad (\%)$$

$$P_3 = 100 - (P_1 + P_2) \quad (\%)$$

where

- P_1 is the percentage of the first clean dry component (component in the first specimen dissolved in the first reagent);
- P_2 is the percentage of the second clean dry component (component in the second specimen dissolved in the second reagent);
- P_3 is the percentage of the third clean dry component (component undissolved in both specimens);
- m_1 is the dry mass of the first specimen after pretreatment (g);
- m_2 is the dry mass of the second specimen after pretreatment (g);
- r_1 is the dry mass of the residue after removal of the first component from the first specimen in the first reagent (g);
- r_2 is the dry mass of the residue after removal of the second component from the second specimen in the second reagent (g);
- d_1 is the correction factor for loss in mass in the first reagent, of the second component undissolved in the first specimen^a;

- d_2 is the correction factor for loss in mass in the first reagent, of the third component undissolved in the first specimen^a;
- d_3 is the correction factor for loss in mass in the second reagent, of the first component undissolved in the second specimen^a;
- d_4 is the correction factor for loss in mass in the second reagent, of the third component undissolved in the second specimen^a.

^a The values of d are indicated in the corresponding clauses of this standard relating to the various methods of analysing binary mixtures.

9.2.3 Variant 2. Formulae to be applied where a component (a) is removed from the first test specimen leaving as residue the other two components ($b + c$), and two components ($a + b$) are removed from the second test specimen leaving as residue the third component (c).

$$P_1 = 100 - (P_2 + P_3) \quad (\%)$$

$$P_2 = 100 \left(\frac{d_1 r_1}{m_1} \right) - P_3 \left(\frac{d_1}{d_2} \right) \quad (\%)$$

$$P_3 = \frac{d_4 r_2}{m_2} \times 100 \quad (\%)$$

where

- P_1 is the percentage of the first clean dry component (component of the first specimen soluble in the first reagent);
- P_2 is the percentage of the second clean dry component (component soluble, at the same time as the first component of the second specimen, in the second reagent);
- P_3 is the percentage of the third clean dry component (component insoluble in both specimens);
- m_1 is the dry mass of the first specimen after pretreatment (g);
- m_2 is the dry mass of the second specimen after pretreatment (g);
- r_1 is the dry mass of the residue after removal of the first component from the first specimen in the first reagent (g);
- r_2 is the dry mass of the residue after removal of the first and second components from the second specimen in the second reagent (g);
- d_1 is the correction factor for loss in mass in the first reagent, of the second component undissolved in the first specimen^a;
- d_2 is the correction factor for loss in mass in the first reagent, of the third component undissolved in the first specimen^a;

d_4 is the correction factor for loss in mass in the second reagent, of the third component undissolved in the second specimen^a.

^a The values of d are indicated in the corresponding clauses of this standard relating to the various methods of analysing binary mixtures.

9.2.4 Variant 3. Formulae to be applied where two components ($a + b$) are removed from a specimen leaving as residue the third component (c), then two components ($b + c$) are removed from another specimen leaving as residue the first component (a).

$$P_1 = \frac{d_3 r_2}{m_2} \times 100 \quad (\%)$$

$$P_2 = 100 - (P_1 + P_3) \quad (\%)$$

$$P_3 = \frac{d_2 r_1}{m_1} \times 100 \quad (\%)$$

where

- P_1 is the percentage of the first clean dry component (component dissolved by the reagent);
- P_2 is the percentage of the second clean dry component (component dissolved by the reagent);
- P_3 is the percentage of the third clean dry component (component dissolved in the second specimen by the second reagent);
- m_1 is the dry mass of the first specimen after pretreatment (g);
- m_2 is the dry mass of the second specimen after pretreatment (g);
- r_1 is the dry mass of the residue after removal of the first and second components from the first specimen with the first reagent (g);
- r_2 is the dry mass of the residue after removal of the second and third components from the second specimen with the second reagent (g);
- d_2 is the correction factor for loss in mass with the first reagent of the third component undissolved in the first specimen^a;
- d_3 is the correction factor for loss in mass with the second reagent of the first component undissolved in the second specimen^a.

^a The values of d are indicated in the corresponding clauses of this standard relating to the various methods of analysing binary mixtures.

9.2.5 Variant 4. Formulae to be applied where two components are successively removed from the mixture using the same specimen.

$$P_1 = 100 - (P_2 + P_3) \quad (\%)$$

$$P_2 = 100 \left(\frac{d_1 r_1}{m} \right) - P_3 \left(\frac{d_1}{d_2} \right) \quad (\%)$$

$$P_3 = \frac{d_3 r_2}{m} \times 100 \quad (\%)$$

where

- P_1 is the percentage of the first clean dry component (first soluble component);
- P_2 is the percentage of the second clean dry component (second soluble component);
- P_3 is the percentage of the third clean dry component (insoluble component);
- m is the dry mass of the specimen after pretreatment (g);
- r_1 is the dry mass of the residue after elimination of the first component by the first reagent (g);
- r_2 is the dry mass of the residue after elimination of the first and second components by the first and second reagents (g);
- d_1 is the correction factor for loss in mass of the second component in the first reagent^a
- d_2 is the correction factor for loss in mass of the third component in the first reagent^a
- d_3 is the correction factor for loss in mass of the third component in the first and second reagents^a.

^a The values of d are indicated in the corresponding clauses of this standard relating to the various methods of analysing binary mixtures.

9.3 Calculation of the percentage of each component with addition of agreed allowance for moisture and other matter and also allowances, where appropriate, for non-fibrous matter removed in the pretreatment

Given

$$X = 1 + \frac{a_1 + b_1}{100}, \quad Y = 1 + \frac{a_2 + b_2}{100},$$

$$Z = 1 + \frac{a_3 + b_3}{100}$$

then

$$P_1A = \frac{P_1X}{P_1X + P_2Y + P_3Z} \times 100 (\%)$$

$$P_2A = \frac{P_2Y}{P_1X + P_2Y + P_3Z} \times 100 (\%)$$

$$P_3A = \frac{P_3Z}{P_1X + P_2Y + P_3Z} \times 100 (\%)$$

where

- P_1A is the percentage of the first clean dry component, including agreed allowance for moisture and loss in mass during pretreatment;
- P_2A is the percentage of the second clean dry component, including agreed allowance for moisture and loss in mass during pretreatment;
- P_3A is the percentage of the third clean dry component, including agreed allowance for moisture and loss in mass during pretreatment;
- P_1 is the percentage of the first clean dry component obtained by one of the formulae given in 9.2;
- P_2 is the percentage of the second clean dry component obtained by one of the formulae given in 9.2;
- P_3 is the percentage of the third clean dry component obtained by one of the formulae given in 9.2;
- a_1 is the agreed allowance for moisture of the first component (see Appendix B) (%);
- a_2 is the agreed allowance for moisture of the second component (see Appendix B) (%);
- a_3 is the agreed allowance for moisture of the third component (see Appendix B) (%);
- b_1 is the percentage of loss in mass of the first component during pretreatment;
- b_2 is the percentage of loss in mass of the second component during pretreatment;
- b_3 is the percentage of loss in mass of the third component during pretreatment;

X, Y, Z are correction factors.

Where a special pretreatment is used the values b_1, b_2 and b_3 should be determined, if possible, by submitting each of the pure fibre constituents to the pretreatment applied in the analysis. Pure fibres are those free from all non-fibrous material except those which they normally contain (either naturally or because of the manufacturing process) in the state (unbleached, bleached) in which they are found in the material analysed.

Where no clean separate constituent fibres used in the manufacture of the material to be analysed are available average values of b_1, b_2 and b_3 , as obtained from tests performed on clean fibres similar to those in the mixture under examination, should be used.

If normal pretreatment by extraction with light petroleum and water is applied b_1, b_2 and b_3 may generally be ignored, except in the case of unbleached cotton, unbleached flax and unbleached hemp where the loss due to pretreatment is usually accepted as 4 % and in the case of polypropylene as 1 %.

In the case of other fibres, losses in the pretreatment are usually disregarded in calculations.

10 Report

10.1 State that the analysis was conducted in accordance with the appropriate method(s) of this standard.

10.2 State whether the result relates to the overall composition of the assembly or to an individual component of the assembly.

10.3 Give details of any special treatment for the removal of size or finish given in substitution for or addition to the specified pretreatment.

10.4 State the number of individual determinations made. Give the individual results and the arithmetic mean, each to an accuracy of 0.1 %.

10.5 State whether the result is based on:

- a) clean dry mass;
- b) clean dry mass with agreed allowances for moisture and other matter and also, where appropriate, for non-fibrous matter removed in the pretreatment, and state the values of the allowances used.

10.6 Whenever possible, state the precision of the method for each component for ternary mixtures. Calculate the precision according to Table 1 (see clause 16).

Section 3. Method of quantitative analysis by manual separation

11 General

This method is applicable to textile fibre mixtures of all types, provided that they do not contain an intimate mixture of two or more different fibres, which can be separated by hand.

12 Principle

After identification of the constituents of the fibre mixture including the composition of the individual yarns, the non-fibrous material is removed by suitable pretreatment and then the constituents are separated by hand, dried and weighed in order to calculate the proportion of each fibre in the mixture.

13 Apparatus and reagents

13.1 Apparatus

The following apparatus, together with apparatus specified in clause 3, is required.

13.1.1 Needle.

13.1.2 Twist tester, or similar apparatus.

13.2 Reagents

No additional reagents are required.

14 Test procedure

14.1 Analysis of yarn

Select from the pretreated sample a specimen weighing not less than 1 g. For a very fine yarn, the analysis may be made on a minimum length of 30 m, whatever its mass. Cut the yarn into pieces of a suitable length and separate the fibre types by means of a needle and, if necessary, a twist tester. The fibre types so obtained are placed in weighing bottles and dried at a temperature of $105 \pm 3^\circ\text{C}$ until a constant mass is obtained, as described in 8.1. Remove the fibre, re-weigh the weighing bottle immediately and determine the mass of fibre by difference.

14.2 Analysis of fabric

Select from the pretreated sample, well away from all selvages, a specimen weighing not less than 1 g, with edges carefully trimmed and running parallel with weft or warp yarns, or in the case of knitted fabrics in the line of wales and courses. In the case of knitted fabrics, ensure that all cut loops are removed before selection of the specimen. Separate the different fibre types, collect them in weighing bottles and proceed as described in 14.1.

15 Calculation and expression of results

15.1 General

Express the mass of each fibre constituent as a percentage of the total mass of the fibres in the mixture. Calculate the results on a clean, dry mass basis or on a clean dry mass with agreed allowances for moisture and other matter and also, where appropriate, for non-fibrous matter removed in the pretreatment.

15.2 Method based on clean dry mass

15.2.1 Binary mixtures

$$P_1 = \frac{100m_1}{m_1 + m_2} = \frac{100}{1 + m_2/m_1} \quad (\%)$$

$$P_2 = 100 - P_1$$

where

P_1 is the percentage of the first clean, dry component;

P_2 is the percentage of the second clean, dry component;

m_1 is the clean, dry mass of the first component (g);

m_2 is the clean, dry mass of the second component (g).

15.2.2 Ternary mixtures

$$P_1 = \frac{100m_1}{m_1 + m_2 + m_3} = \frac{100}{1 + \frac{m_2 + m_3}{m_1}} \quad (\%)$$

$$P_2 = \frac{100m_2}{m_1 + m_2 + m_3} = \frac{100}{1 + \frac{m_1 + m_3}{m_2}} \quad (\%)$$

$$P_3 = 100 - (P_1 + P_2) \quad (\%)$$

where

P_1 is the percentage of the first clean, dry component;

P_2 is the percentage of the second clean, dry component;

P_3 is the percentage of the third clean, dry component;

m_1 is the clean, dry mass of the first component (g);

m_2 is the clean, dry mass of the second component (g);

m_3 is the clean, dry mass of the third component (g).

15.3 For calculation of the percentage of each component with adjustment for agreed allowance for moisture and other matter and also, where appropriate, for non-fibrous matter removed in the pretreatment, see 9.1.3 in the case of binary mixtures and 9.2 and 9.3 in the case of ternary mixtures