Draft Standard

NOTE1 Where italics appear in the draft method this indicates an area that requires additional work and confirmation.

NOTE 2 Although the title of the method and body of the text states 'composted organic materials' it does not mean that the method may not be suitable for other forms of waste.

A method to determine the visual recognisable impurities in composted organic materials based on bleach washing

Contents

Safety warning

Care should be taken when handling samples that may contain sharp fragments, chemical contaminants or possible pathogenic organisms.

1. Scope and field of application

A method to determine the visual recognisable impurities in composted organic materials, soil improvers and growing media. The sample shall be obtained in accordance with SOIL IMPROVERS AND GROWING MEDIA - SAMPLING (EN 12579). The procedures described herein are only applicable to processed organic waste, sludge and soil.

2. Normative references

This method incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this method only when incorporated in it by amendment or revision. For undated references the latest edition of the publications referred to apply.

ISO 5725:1994	Precision of test methods - determination of repeatability and reproducibility for a standard test method by inter-laboratory tests.
EN 12579:2000	Soil improvers and growing media - Sampling
EN 13040:1999	Soil improvers and growing media - Sample preparation for chemical and physical test, determination of dry matter content, moisture content and laboratory compacted bulk density

3. Principle

After drying, the test material is bleach washed on a 2 mm sieve. The fraction > 2 mm is dried and the fractions of coarse stones (>5 mm) and plastics (>20 mm) and differentiated impurities (> 2 mm) are determined.

4. Definitions

For the purpose of this standard the definitions given in PD CR 13456, EN 12579, EN13040 and PAS 100 apply.

5. Reagents

5.1 **Bleach, t**he strongest commercially available bleach is used, i.e. 9.6% chlorine (48 º in other units). This is a mixture of NaOCl (sometimes written as NaClO) and NaCl and NaOH. The acceptable range is 9,6 – 7,2 % (or 48º to 36º).

5.2 **Water,** normal drinking water quality tap water or purer.

6 Apparatus

6.1 **Sieves,** diameter 200 mm or 300 mm 2, 5 and 20 mm apertures, ISO 3310-1:2000 or ISO 3310-2, 1999.

6.2 **Analytical balance,** with an accuracy of 0.01 g.

6.3 **Drying oven,** ventilated, fan assisted, capable of holding sample trays 80 ±3 ^{o}C.

6.4 **Sample tray,** constructed of material thermally stable up to 150 ^{o}C, surface approximately 1250 cm^2.

6.5 **Beaker,** 300 ml.

6.6 **Tweezers.**

6.7 **Camera and graph paper,** the plastic films are spread and pasted on a sheet of graph paper (1 mm^2 mesh). The sheet is photocopied or photographed and the copy is enlarged to facilitate counting the squares. The area covered by the plastic films is counted.

Image analysis is an alternative method in which plastics are spread and pasted as flat as possible on a contrasting surface such as a sheet of bright blue paper of known dimensions.

Figure 1 Selected plastics on a blue sheet, note the rumpling and discolouration

A photograph with a digital camera is taken with > 0.9 Mb per picture and more than 75 % of the image area filled by the contrasting sheet of known dimensions. The image is processed with a simple program e.g. Image-pro. First the parts around the sheet with the contrasting colour are clipped of. From the resulting area of known dimensions, the part showing the contrasting colour of the sheet is then estimated in percent of the total area The area of the plastics is then calculated as (known area of background paper) * (100-(percentage filled by background paper colour)/100).

6.8 **Container,** a 10 litre container of plastic.

6.9 **Glass rod,** a 40-60 cm rod for stirring the solution in the container which can resist bleach and temperatures up to 100 degrees Celsius.

7 Procedure

7.1 Sample preparation

7.1.1 Prepare the test sample in accordance with EN 13040:1999, clause 8.1, 8.2. Where 20% w/w or less of the laboratory sample has been retained the procedure can be continued. If not the method is not appropriate.

NOTE larger quantities may be required for very coarse samples.

7.1.2 Determine the test amount of test sample depending on the coarseness of the sample. For 0-100 mm 7.5 l is taken, for a sample with a fraction 0-40 mm 3 l is taken, for a sample with a fraction 0-25 mm 1.5 l is taken and for fine materials 0-12 mm 1 l is taken and put in the sample tray **(6.4)**.

NOTE the method is performed in duplicate.

7.1.3 Dry the materials for at least 16 hours until constant weight in the drying oven **(6.3)**.

7.1.4 Determine the dry weight with the balance **(6.2)**.

7.2 **Sieving and destruction of organic matter by bleach (2, 4 and 12 hours),**

7.1.1 **First washing.** Put portions of 500 ml or less of the dried material in a 10 litres container **(6.8)**. Put the container under an extractor hood to safely and continuously remove chlorine and carbon dioxide gasses formed. Cover the sample with 1-2 litres bleach **(5.1)** and mix with a glass rod **(6.9)**. The chemical reaction is exothermic, very quick and produces gasses. Foresee possible overflows and do not stir until the temperature is below 80 degrees Celsius. Prevent the formation of a gaseous cake on the liquid. Leave the material for two hours in the bleach. Than pour the sample on a sieve with 2 mm meshes and wash briefly with water.

7.1.2 **Second washing.** Put the fraction > 2mm **(7.1.1)** back into the container **(6.8)** and bleach a second time i.e. cover the sample with 1-2 litres bleach **(5.1)** and mix with a glass rod **(6.9)**. Leave the material for four hours in the bleach. Than pour the sample on a sieve with 2 mm meshes and wash briefly with water.

7.1.3 **Third washing.** Put the fraction > 2mm **(7.1.2)** back into the container **(6.8)** and bleach a third time i.e. cover the sample with 1-2 litres bleach **(5.1)** and mix with a glass rod **(6.9)**. Leave the material for twelve hours in the bleach. Pour the sample on a sieve with 2 mm meshes and rinse with water one last time what is on the sieve.

7.1.4 **Drying.** Dry the materials **(7.1.3)** for at least 16 hours until constant weight in the drying oven **(6.3).**

7.1.5 **The 20 mm sieve.** Using the beaker **(6.5),** transfer portions of 100 ml or less of the dried sample **(7.1.4)** onto the 20 mm sieve **(6.1)**. Spread the >20 mm fractions one by one on a flat surface and gather the plastic particles > 20 mm with help of the tweezers **(6.6)**. Continue this procedure until the entire sample **(7.1.4)** has been sieved. Determine the total weight of the fraction rigid plastic and the fraction plastic light (flexible or film) individually using the balance **(6.2)**. Determine the total surface area of the fraction rigid plastic and the fraction plastic light (flexible or film) individually using graph paper and a camera **(6.7)**.

7.1.6 **The 5 mm sieve.** Recombine the fractions < 20 mm and > 20 mm without the plastics > 20 mm **(7.1.5)**. Using the beaker **(6.5),** transfer portions of 100 ml or less of the recombined sample on to the 5 mm sieve **(6.1).** Spread the >5 mm fractions one by one on a flat surface and gather the stones > 5 mm with help of the tweezers **(6.6).** Determine the weight of stones using the balance **(6.2).**

7.1.7 **The 2 mm sieve.** Recombine the fractions <5 mm and >5 mm without the stones >5 mm **(7.1.6)**. Using the beaker **(6.5),** transfer portions of 100 ml or less of the recombined sample on to the 2 mm sieve **(6.1).**Spread the fractions >2 mm one by one on a flat surface and search out all visual recognisable impurities using the tweezers **(6.6)**. Sort out the following materials: stones, glass, rigid plastic, plastic light (flexible or film), metal. Determine the weight of the individual type of impurities using the balance **(6.2).**

NOTE For samples with a visibly low organic matter content.(or < 15.0 w% of the dry sample), washing the material for 5 minutes with water instead of bleach and without waiting time is allowed. If there is any doubt about the proper discrimination and classification of impurities, bleach washing should still be performed.

Thus the table below may be filled.

Table 1 Data recorded in the dry sieving for impurities

		weight	Surface
		In g	In cm^2
> 20 mm	Plastics rigid	y	y
> 20 mm	Plastics light	y	y
> 5 mm	Stones	y	-
> 2 mm	Stones	y	-
> 2 mm	Glass	y	-
> 2 mm	Plastics rigid	y	y
> 2 mm	Plastics light	y	y
> 2 mm	Metals	y	-

8 Calculations and expression of results

The mass of the impurities is expressed on the total dry weight (before sieving). The average results are calculated of the duplicates.

$$I_{P>20\ mm} = \frac{W_{p>20\ mm}}{T} \times 100\%$$

$$I_{R>20\ mm} = \frac{W_{R>20\ mm}}{T} \times 100\%$$

$$I_{S>5\ mm} = \frac{W_{S>5\ mm}}{T} \times 100\%$$

$$I_{G>2\ mm} = \frac{W_{G>2\ mm}}{T} \times 100\%$$

$$I_{P>2\ mm} = \frac{W_{P>2\ mm}}{T} \times 100\%$$

$$I_{R>2\ mm} = \frac{W_{R>2\ mm}}{T} \times 100\%$$

$$I_{M>2\ mm} = \frac{W_{M>2\ mm}}{T} \times 100\%$$

Where

I is the impurity part (%)
W is weight of impurity type
T is the total dry weight
S is stones
G is glass
P is rigid plastic
R is plastic light (flexible or film)
M is metal

9 Precision

Area of plastics in cm^2, starting with 1 cm^2. From 0-10 cm2 +/- 0.5 cm2. From 10 cm2 and larger with 5% accuracy. No further data on precision have been defined yet.

10 Test report

The test report shall include the following information:

a) a reference to this Standard;
b) a complete identification of the sample;
c) the results of the different fractions expressed as % on dry matter basis on 2 decimal places
d) any details not specified in the Standard, or which are optional, as well as any other factor, which may have affected the results.