



European PET Bottle Platform

Quick Test QT502

Sink-float separation test

Website version

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1. Introduction

The objective of the European PET Bottle Platform (EPBP) is to evaluate technologies and products to allow new PET bottle innovations whilst optimizing the environmental and economic consequences for the recyclability of PET.

EPBP has formulated guidelines to evaluate the influence of bottle innovations - such as barrier materials, resin formulations, additives and non-PET components in or on PET bottles - on R-PET recycling processes. Barrier materials can be applied as a coating, introduced in a co-injected multilayer configuration or blended with the matrix material. Additives can be incorporated into the base material during polymerisation or added during injection moulding in the form of liquid or solid master-batches. Other non-PET components can be labels, glue, sleeves, caps, printings, etc. .

Laboratory analyses on the recyclability of new innovative PET bottles can be relatively expensive and usually have a time delay between sampling and getting useable results of several months. Besides, assessing the test results is a difficult task that requires training and experience. This is often seen as an inconvenience.

For this reason, EPBP has developed a series of rapid and low-cost techniques for the quick assessment of PET bottles. All quick tests include a complete explanation of the scope, techniques, equipment and test conditions, as well as a “summary interpretation” explaining how to use the test results. Quick tests can either be executed at the internal laboratory facility or by an independent test laboratory with minimal investment in equipment.

The results of the quick tests are purely indicative, and may not be considered as an advice, a recommendation or a formal approval by EPBP. For a complete assessment, further tests are required to highlight all possible effects of innovative PET bottles on the recyclability of collected bottles into r-PET, the processing of the r-PET into products and the final product properties. Please contact EPBP for more information.

SAFETY PRECAUTIONS

This guideline is intended for use by qualified personnel who recognize safety hazards and are familiar with the safety precautions required in regard to application of this guideline. The appropriate laboratory safety procedures must be used before, during, and after testing operations.

2. Quick Test QT 502

Scope

Floatation is an efficient, density based sorting method used to separate light, floating components (such as caps and labels) from heavy, sunk components (such as ground PET bottles). Non-PET components that sink together with PET flakes cause serious processing inefficiencies which limit the use of r-PET in applications such as bottles, film, sheet and fibre. Combinations of PET with other material types that sink in water should be avoided.

The density of some materials may change by applying heat. This Quick test has therefore a separate procedure in hot water for foamed materials and shrink sleeves or labels. All other labels or components can be tested in cold water.

Principle

The efficiency of the sink float separation procedure is determined by the amount of test sample that floats at the surface of the water.

Apparatus

- Technical balance, accurate to 0,1 g
- Beakers of 1000 ml
- Hot plate stirrer, or similar equipment
- pH meter
- Drying oven
- Thermometer(0-100°C, +/-1°C)

Sample

50 g PET flakes (bottle regrind - clean and dry - no caps/labels) - record the weight
50 g regrind from test sample (cap, label, seal, etc. - clean and dry) - record the weight

Procedure (foamed materials and shrink sleeves or labels)

- Fill beaker with 700 ml tap water (pH between 7 and 8)
- Boil the water for 10 minutes, and allow cooling to room temperature
- Fill beaker with 350 ml water (boiled/cooled)
- Heat the water at 85°C
- Put the test sample in the hot water and stir at 500 rpm for 15 minutes
- Remove the beaker from the magnetic stirrer
- Allow the water to cool down to 25-30°C
- Remove all particles that float at the surface with a sieve
- Eliminate any PET flakes which might got trapped in the floatables
- Dry the floating fraction for 2 hours at 80°C
- Cool to room temperature, weigh and record the weight of the float fraction
- Repeat the test with the PET bottle regrind

Procedure (other potential floatable components)

- Fill beaker with 700 ml tap water (pH between 7 and 8)
- Boil the water for 10 minutes, and allow cooling to room temperature
- Fill beaker with 300 ml water (boiled/cooled)
- Put the test sample in the water and stir at 500 rpm for 2 minutes
- Stop the magnetic stirrer and allow the water to rest for 2 minutes
- Remove all particles that float at the surface with a sieve
- Eliminate any PET flakes which might got trapped in the floatables
- Dry the floating fraction for 2 hours at 80°C
- Cool to room temperature, weigh and record the weight of the float fraction
- Repeat the test with the PET bottle regrind

Results

The efficiency of the sink float separation is calculated as follows:

floatation efficiency = (weight of floating fraction) / (weight of test sample) x 100 (in %).

Test report

The test report includes the following information:

- Reference to the EPBP Quicktest QT 502
- All details necessary for complete identification of the material tested
- Description and detailed photos of the samples before, during and after testing
- Floatation efficiency of each sample
- Details of any deviation from the test method, as well as any incident which may have influenced the results
- Date and place of the test

Remark

This quick test is designed as a quality indicator to monitor a single critical parameter in PET recycling. Other specific tests are needed to carry out a full screening for possible effects of innovative PET bottles on the recyclability of collected bottles into r-PET, the processing of the r-PET into products and the final product properties. Please contact EPBP for more information.

Photos



Photo 1: From left to right, beaker with 300 ml water at pH 7,5; label sample; regrind caps sample



Photo 2: Sink float separation of regrind caps sample



Photo 3: Sink float separation of regrind labels sample