# CHI-C5-SEP
# Disintegration and Density Separation Test for Plastic-based Packaging

Version 1.1

The density criterion considers the fact that float-sink sorting is the central process step to produce high-quality recyclate within plastics reprocessing. In the recycling of polyolefins only the fraction with a density of less than 0.995 g/cm³ is used to produce PO (PE, PP) recyclates.

This CHI test method was developed by cyclos-HTP for polyolefin-based (PE or PP) packaging and includes the following steps (Principle of the test method is shown in the flow chart on page 2):

## 1. Materials and Equipment

a. Polyolefin-containing packaging sample with unknown composition and density
b. Scale with accuracy of 0.01g
c. Beaker with a volume of 1L
d. Magnetic stirrer with heating device and thermometer
e. Circulating air dryer

## 2. Disintegration

a. Grind the samples to flakes on a lab granulator (10 mm screen) or manually with a knife or scissors and document results.
b. Weigh test sample and report as "A"

## 3. Density separation (Float-Sink test)

a. Fill a beaker with 700 ml of tap water
b. Measure and record the water temperature and density with a hydrometer. Under standard conditions for polyolefins[A] the test should be carried-out with a specific density of 0.995 g/cm³ which relates to a range of the water temperature between 30 and 34°C [B].
c. Stir the test sample in water with a magnetic stirrer for 2 minutes at about 500 rpm.
d. Stop the magnetic stirrer and let the sample rest for 2 minutes; ensure that no bubbles are present at the floating particles, by demand one drop of liquid soap can be added.
e. Remove floating particles with a sieve and record.
f. Filter and record sinking particles.
g. Dry floating particles in a circulating air dryer at 80°C for 2 hours.
h. Weigh floating particles and report as "B".

## 4. Evaluation of results

Calculate the efficiency of the float-sink separation “$SEP_f$” according to the formula:

$$SEP_f = \frac{B}{A} \times 100\%$$

## Version history:

| *Version No.* | *Date* | *Reason/Content of revision* |
|---|---|---|
| 1.0 | Jan 2018 | First version of test method |
| 1.1 | Sep 2021 | Supplementary information on the test conditions |

[A] *According to the Minimum Standard of the ZSVR; Version of Aug 31, 2021*

[B] *NIST Standard Reference Database 69: NIST Chemistry WebBook, Thermophysical Properties of Fluid Systems, Isobaric Properties for Water, 2008*