

MT 148.2 POURABILITY

SCOPE

The pourability test provides information on residues remaining in a measuring cylinder or commercial sales pack after pouring the formulation. If required, a residue after rinsing with water can be determined.

The method was developed for suspension concentrates. It may also be used for other dispersed liquid formulations.

REASON FOR REVISION

The method was editorially revised and a tiered approach for pouring and optional rinsing up to three times is described. The standing time before pouring the sample is reduced to 30 min. Results obtained with MT 148.2 are equivalent to those obtained with MT 148 and MT 148.1. MT 148.2 supersedes MT 148 and MT 148.1.

OUTLINE OF METHOD

A measuring cylinder is filled with freshly homogenized formulation. After standing for 30 min, the test sample is poured according to a standardised pouring procedure, and the amount remaining in the cylinder is determined. If required, the cylinder may be additionally rinsed up to three times with water and the amount remaining in the cylinder after each rinsing step be determined.

REAGENTS

Water, deionised

APPARATUS

Balance with an accuracy of at least ± 0.01 g

Measuring cylinder 500 ml, glass, stoppered with dimensions:

Capacity corresponding to highest graduation line	= 500 ml
Internal height to highest graduation line	= min. 250 mm
Overall height to base of neck	= max. 390 mm
Distance from highest graduation line to base of neck	= min. 45 mm

Stopper (rinsing procedure only)

PROCEDURE

All operations are performed at ambient temperature ($25 \pm 5^\circ\text{C}$).

Weigh the empty measuring cylinder (Note 1) to the nearest 0.01 g (m_0 in [g]).

Fill the measuring cylinder with freshly homogenized test sample approximately to the 500 ml mark (Note 2). Wipe off any material adhering to the joint or the outside of the cylinder. Weigh the filled cylinder to the nearest 0.01 g (m_1 in [g]).

After standing for approximately 30 min, pour the test sample by holding the cylinder 60 s at an angle of 45° with respect to horizontal and then 60 s vertically with the opening pointing down (Note 3, Figure 1). Wipe off any material on the outside of the cylinder before weighing the emptied cylinder without stopper to the nearest 0.01 g (m_2 in [g]).

Rinsing procedure, if required

Unless specified otherwise, rinsing is required for residues above 5%. Fill the emptied cylinder with deionized water approximately to the 500 ml mark, washing down the test sample from the joint. Insert the stopper and invert the stoppered cylinder 10 times (Note 4). Empty the cylinder as described in the pouring procedure. Wipe off any material on the outside of the cylinder before weighing the rinsed cylinder without stopper to the nearest 0.01 g (m'_n in [g]). In case a rinsed residue is above 0.25%, the rinsing procedure can be repeated twice yielding up to three rinsed residues.

CALCULATION

Calculate the residue (R) of the pourability using the following equation.

$$R = (m_2 - m_0) / (m_1 - m_0) \cdot 100 [\%]$$

m_0 = mass of cylinder (empty, without stopper)

m_1 = mass of cylinder (filled with test sample, without stopper)

m_2 = mass of cylinder (after pouring, without stopper)

If performed, calculate the rinsed residue $R'(n)$ after the first, second and third rinsing step using the following equation.

$$R'(n) = (m'_n - m_0) / (m_1 - m_0) \cdot 100 [\%]$$

$R'(n)$ = rinsed residue after n rinsing steps, e.g. $R'(2)$ = rinsed residue after second rinsing

n = number of rinsing steps (values can be 1, 2, 3)

m_0 = mass of cylinder (empty, without stopper)

m_1 = mass of cylinder (filled with test sample, without stopper)

m'_n = mass of cylinder (after n rinsing steps, without stopper)

REPORTING

Report the pourability as residue (R) to the nearest 0.1 %.

If performed, report the rinsed residue $R'(n)$ after the first, second and third rinsing step to the nearest 0.01 % (Note 5).

If a representative commercial pack is used, report the material, container type and nominal volume, e.g., high density polyethylene bottle / 1 l.

The measurement uncertainty found in the DAPF collaborative trial (Note 6) was 1.0% (SD, absolute) for the pourability and 0.1% (SD, absolute) for the rinsed residue.

Note 1 Alternatively, the test can be performed with a representative commercial pack, e.g., a 1 l high density polyethylene bottle. This must be reported with the result.

Note 2 500 ml correspond to a filling level of approximately 80 % of the brim-full cylinder volume (brim-full volume = nominal volume plus headspace) and reflects the typical filling of commercial packs. When the pourability test is performed with a commercial pack (e.g., a 1 l bottle), fill to the commercial filling volume (e.g., 1 l).

Note 3 If there is no more run-off, the pouring time of 60 s can be shortened.

Note 4 The expression "invert the cylinder" implies that the stoppered cylinder is turned by hand through 180° and is brought back to the original position, the whole operation being completed within approximately 2 s.

Note 5 In practice, a residual amount of water will remain even after repeated rinsing. This blank value for the rinsing residue R' can be up to 0.2%.

Note 6 DAPF trial performed for the revision of the method, participation of 10 laboratories, one sample suspension concentrate (SC) and one sample oil dispersion (OD) with two replicates each and repetition with two replicates each of recycled material.

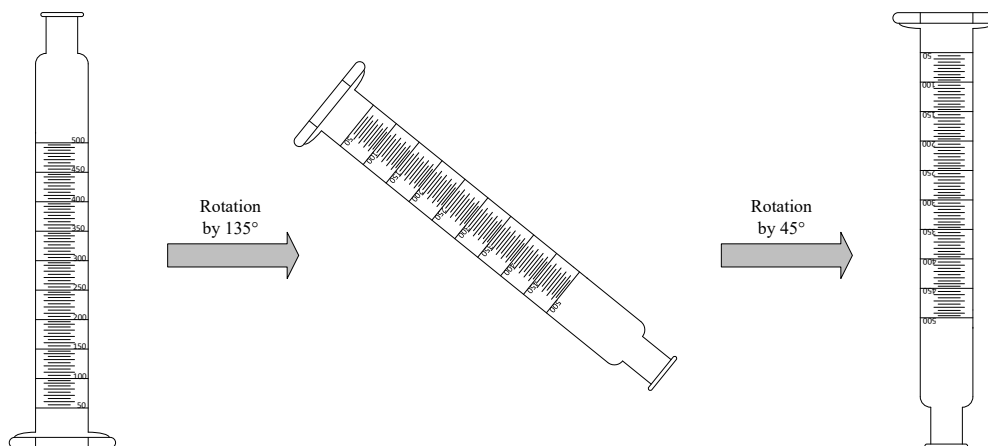


Figure 1: Pouring procedure.