7.34 **OIL DISPERSIONS (OD)**

### **Introduction**

An oil dispersion (OD) is a stable suspension of active ingredient(s) in an organic fluid, which may contain other dissolved active ingredient(s), intended for dilution with water before use.

OD formulations are metastable systems, like emulsions, oil-in-waters (EW) and suspension concentrates (SC). Therefore, after transportation and storage it may be necessary to re-homogenise the formulation, either by shaking or by stirring.

OD, like SC formulations, do not disperse as spontaneously as EC formulations upon dilution in water. Therefore the spray solution has to be stirred in order to obtain a homogeneous dispersion before application.

The parameters which best describe the performance characteristics are:

* pourability (to ensure that the OD can be poured from its container);
* dispersion stability, wet sieve and persistent foam tests (to ensure the sprayability and stability of the diluted suspension);
* storage at elevated temperature (to ensure the absence of crystal growth upon storage).

Information about other properties may also be given, e.g. mass per millilitre, acidity or alkalinity and stability at 0 °C, but these parameters do not normally constitute essential parts of the specification.

Note for preparation of draft specifications. Do not omit clauses or insert additional clauses, nor insert limits that are more lax than those than given in the guidelines, without referring to section 4. From the “Notes” provided at the end of this guideline, incorporate only those which are applicable to the particular specification.

**...... [ISO common name] OIL DISPERSION**

[CIPAC number]/OD (month & year of publication)

## 7.34.1 Description

The material shall consist of a stable suspension of fine particles of technical ...... [ISO common name], complying with the requirements of FAO/WHO specification ......, in the form of ...... (see Section 4.2)*,* in a non-aqueous fluid together with suitable formulants. After shaking or stirring of the sample, the material shall be homogeneous (Note 1).

## 7.34.2 Active ingredient

## 7.34.2.1 Identity tests (Note 2)

 The active ingredient shall comply with an identity test and, where the active remains in doubt, shall comply with at least one additional test.

## 7.34.2.2 ...... [ISO common name] content (Note 2)

 The ...... [ISO common name] content shall be declared (g/kg or g/l at 20 ± 2 °C, Note 3) and, when determined, the content measured shall not differ from that declared by more than the appropriate tolerance, given in the table of tolerances, Section 4.3.2.

## 7.34.3 Relevant impurities

## 7.34.3.1 By-products of manufacture or storage (Note 4), if required

Maximum: ......% of the …… [ISO common name] content found under 7.34.2.2.

## 7.34.4 Physical properties

##  7.34.4.1 Acidity and/or Alkalinity (MT 191) or pH range (MT 75.3) (Note 5), if required

Maximum acidity: ...... g/kg calculated as H2SO4.

Maximum alkalinity: ...... g/kg calculated as NaOH.

pH range: ...... to ......

## 7.34.4.2 Pourability (MT 148.1)

Maximum “residue”: ......%.

## 7.34.4.3 Dispersion stability (MT 180)

The formulation, when diluted (Notes 6 & 7) with CIPAC Standard waters A and D, shall comply with the following:

|  |  |
| --- | --- |
| Time after allowing the dispersion to stand | Limits of stability |
| 0 h | Initial dispersion complete |
| 0.5 h | “Cream”, maximum: ...... ml“Free oil”, maximum: ...... ml“Sediment”, maximum: ...... ml |
| 24 h | Re-dispersion complete |
| 24.5 h | “Cream”, maximum: ...... ml “Free oil”, maximum: ...... ml“Sediment”, maximum: ...... ml |

## 7.34.4.4 Wet sieve test (MT 185 ) (Note 8)

Maximum: ......% of the formulation shall be retained on a ...... μm test sieve.

## 7.34.4.5 Persistent foam (MT 47.3) (Note 9)

Maximum: ...... ml after 1 min.

 7.34.4.6 **Particle size distribution** (MT 187), if required

 …% of particles shall be in the range … to … (Note 10)

## 7.34.5 Storage stability

## 7.34.5.1 Stability at 0 °C (MT 39.3)

After storage at 0 ± 2 °C for 7 days, the formulation shall continue to comply with the clauses for:

- dispersion stability (7.34.4.3),

- wet sieve test (7.34.4.4),

as required.

## 7.34.5.2 Stability at elevated temperature (MT 46.3)

After storage at 54 ± 2 °C for 14 days (Note 11), the determined average active ingredient content must not be lower than ......% relative to the determined average content found before storage (Note 12) and the formulation shall continue to comply with the clauses for:

- by-products of manufacture or storage (7.34.3.1),

- acidity, alkalinity or pH range (7.34.4.1),

- pourability (7.34.4.2),

- dispersion stability (7.34.4.3),

- wet sieve test (7.34.4.4),

as required.

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Note 1 Before sampling to verify the formulation quality, inspect the commercial container carefully. On standing, oil-based suspension concentrates (OD) usually develop a concentration gradient from the top to the bottom of the container. This may even result in the appearance of a clear liquid on the top and/or of sediment on the bottom. Therefore, before sampling, homogenise the formulation according to the instructions given by the manufacturer or, in the absence of such instructions, by gently shaking of the commercial container (for example by inverting the closed container several times). Large containers must be opened and stirred adequately. After this procedure, the container should not contain a sticky layer of non-dispersed matter at the bottom. A suitable and simple method of checking for a non-dispersed sticky layer (“cake”) is by probing with a glass rod or similar device adapted to the size and shape of the container. All the physical and chemical tests must be carried out on a sample taken after the recommended homogenisation procedure.

Note 2 Method(s) of analysis must be CIPAC, AOAC or equivalent. If methods have not yet been published then full details, with appropriate method validation data, must be submitted to FAO/WHO by the proposer.

Note 3 Unless homogenisation is carried out carefully, it is possible for the sample to become aerated. This can lead to errors in the determination of the mass per millilitre, and in the calculation of the active ingredient content (in g/l), if methods other than OECD 109 are used. If the buyer requires both g/kg and g/l at 20 ± 2 °C, then in case of dispute the analytical results shall be calculated as g/kg.

Note 4 This clause should include only relevant impurities and the title should be changed to reflect the name of the relevant impurity. Method(s) of analysis must be peer validated.

Note 5 The method to be used shall be stated. If several methods are available, a referee method shall be selected.

Note 6 Unless another temperature is specified.

Note 7 The formulation should be tested at 2% dilution or, alternatively, at the highest and lowest rates of use recommended by the supplier, provided they are within the scope of the method.

Note 8 This test detects coarse particles (e.g. caused by crystal growth) or agglomerates (crust formation) or extraneous materials which could cause blockage of spray nozzles or filters in the spray tank.

Note 9 The mass of sample to be used in the test should correspond to the highest rate of use recommended by the supplier. The test is to be conducted in CIPAC standard water D.

Note 10 Percentages may be specified in one or more ranges, as appropriate to the product. Laser diffraction is not always suitable to measure the particle size distribution of liquid formulations. This should be evaluated by 4.5.31 Wet sieve test and 4.5.43 Suspensibility or 4.5.44 Dispersion stability.

Note 11 Unless other temperatures and/or times are specified. Refer to Section 4.6.2 of this Manual for alternative storage conditions.

Note 12 Samples of the formulation taken before and after the storage stability test should be analysed concurrently after the test in order to reduce the analytical error.