

DIN EN 17417:2021-01 (E)

Determination of the ultimate biodegradation of plastics materials in an aqueous system under anoxic (denitrifying) conditions - Method by measurement of pressure increase

Contents		Page
European foreword		4
Introduction		5
1	Scope	6
2	Normative references	6
3	Terms and definitions	6
4	Principle	9
5	Equipment and materials	9
5.1	Pressure measurement system	9
5.2	Stirring platform or single magnetic stirrers	10
5.3	Room or incubator with a constant temperature of (20 ± 2) °C	10
5.4	Argon for the elimination of oxygen from the medium and the gas space	10
5.5	Thermometer	11
5.6	Membrane filter	11
5.7	Activated sludge from the denitrification tank of a waste water treatment plant	11
5.8	KOH or used for sorption	11
5.9	HCl used for titration	11
5.10	pH meter with electrodes	11
5.11	Pipettes, pipette tips	11
5.12	Photometric cuvette tests	11
5.13	Photometer for the procedures or cuvette tests	12
5.14	Analytical balance	12
6	Preparation	12
6.1	Determination of the volume of each reaction vessel	12
6.2	Sample preparation	12
6.3	Preparation of the medium	12
6.3.1	Reagents	12
6.3.2	Distilled or deionized water	12
6.3.3	Preparation of the concentrates	12
6.3.4	Preparation of the medium	14
6.4	Preparation of the inoculum	14
7	Test procedure	14
7.1	Start of test	14
7.2	Determination of the initial concentrations (analytical sample)	16
7.2.1	Determination of pH	16
7.2.2	Determination of the suspended solids of the inoculum	16
7.2.3	Determination of ammonia-nitrogen, nitrite-nitrogen and nitrate-nitrogen (for a nitrogen balance)	16
7.2.4	Protein determination (for a nitrogen and carbon balance)	16
7.2.5	Determination of DOC (for a carbon balance)	17
7.3	Incubation period	17
7.4	End of test	17

7.5	Determination of CO ₂ absorbed in absorption vessels (for a carbon balance)	17
8	Calculation and evaluation	17
8.1	Calculation of the theoretical N ₂ production	17
8.2	Calculation of the present N ₂ production	18
8.3	Calculation of the level of degradation related to the nitrogen production	19
8.4	Generation of a nitrogen balance	19
8.5	Evaluation and expression of results	20
9	Validity of results	20
10	Test report	21
Annex A(informative) Test scheme -- Calculation of the maximum permitted initial mass of the test substance and the minimum nitrate concentration		22
A.1	General	22
A.2	Upper pressure measurement limit	22
A.3	Sorption capacity of the sorption solution (if applicable)	23
A.4	pH buffer capacity of the medium	23
A.5	Minimum nitrate concentration	24
Annex B(informative) Examples of degradation curves		25
Annex C(informative) Calculation of the produced inorganic carbon and preparation of a carbon balance		28
C.1	Calculation of the produced inorganic carbon	28
C.2	Generation of a carbon balance	29
C.3	Calculation of the level of biodegradation related to carbon	30
Bibliography		31