

Rapport d'essai :
Test verslag : NO40754.01.01
Test report :

page: 1/8

BfB code : 40754

Client :
Klant :
Customer :

NORD RESINE
Via Fornace Vecchia, 79
I-31058 Susegana (Treviso)
Att.:Stefano Martin

Date d'arrivee :
Ontvangstdatum : 10/11/2003
Date of receipt :

Date d'émission du rapport :
Rapport verzendingsdatum : 23/12/2003
Report emission date :

Biodegradability Test Report (According to OECD 301 B)

TEST COMPOUND

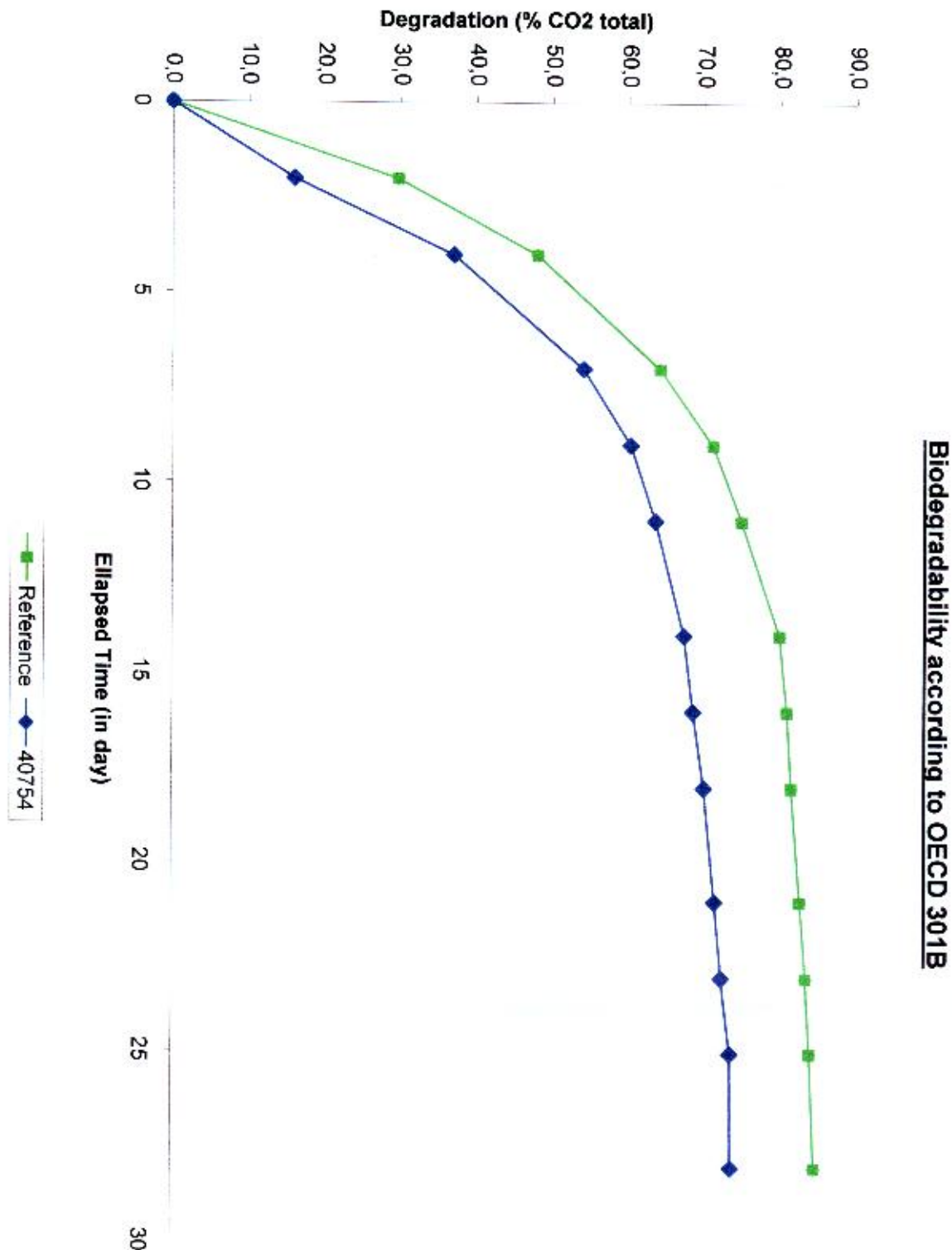
Sample received: 10/11/2003
Storage conditions: Room temperature
Starting Test Date: 24/11/2003
Customer's Sample Name/Code: Nordoil W
BfB Code: 40754

TEST DETAILS

Nature of the Reference Compound: Na Benzoate (3 g/l)
Origin and Concentration of the Inoculum: Station Epuration Wavre 2nd Stage; 21/11/2003
>10⁶ CFU/ml (Verification with Merck Cult Dip Combi)
Incubation: t°: 21,4°C-20,8°C Duration: 28 days.
PII: start: 7.9 end: 6.4
Sample description and concentration: The product is tested directly (±20 mg C/l)
Total Organic Carbon content: 8.7%
Tested by: Steve Louvat

RESULTS

Biodegradability according to OECD 301B= 73.7%



Observation : Ce rapport ne peut être reproduit partiellement, ni utilisé et mentionné dans un but de publicité quelqu'il soit, sans l'approbation écrite de la direction de BFB.
 Ce rapport d'essai est d'ailleurs uniquement valide pour la société mandante et ne concerne que les échantillons soumis à l'essai.

Aanmerking : Dit rapport mag noch gebruikt, noch verspreid worden voor om het even welke reclame doeleinden, zonder voorgaandelijke goedkeuring van de directie van BFB.
 Dit rapport is enkel geldig voor de door ons gearanalyseerde monsters en alleen bruikbaar door de opdrachtgever.

Remark : This report may not be reproduced even partially, nor be used or mention be made in publicity without written approval from BFB director.
 This report concerns exclusively sample and is only dedicated to the constituent.

ANALYSIS AND RESULTS

The sample biodegradability is calculated from the released CO₂ compared to a blank and the reference.

Test results

Day n°	Reference		40754	
	% CO2 product	% CO2 total	% CO2 product	% CO2 total
0	0,0	0,0	0,0	0,0
2	29,6	29,6	16,0	16,0
4	18,4	48,0	21,0	37,0
7	16,1	64,2	17,1	54,1
9	7,0	71,2	6,3	60,4
11	3,8	75,0	3,2	63,6
14	5,0	80,0	3,8	67,4
16	1,0	81,0	1,2	68,6
18	0,6	81,6	1,4	70,0
21	1,1	82,7	1,5	71,5
23	0,8	83,6	0,9	72,4
25	0,5	84,1	1,2	73,6
28	0,7	84,7	0,1	73,7

Sample Biodegradability = 73.7 %

Reference Biodegradability = 84.7 % / Blank control = 30.1 mg.

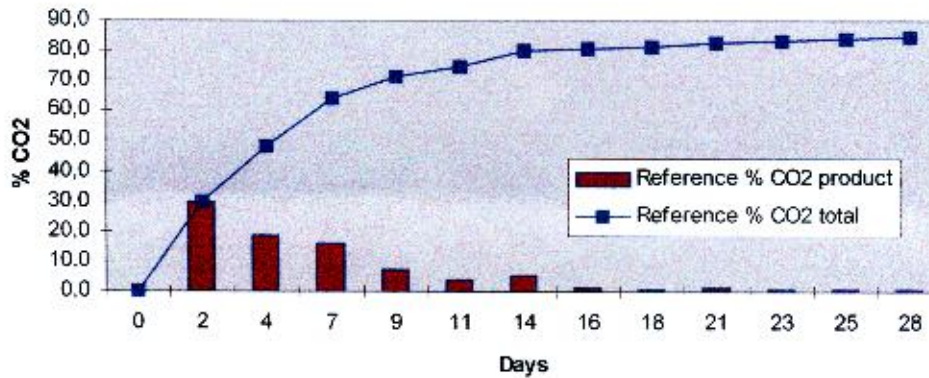
N.B.: The Reference Biodegradability must be >60%. The Blank control must be <50mg

Test analysis

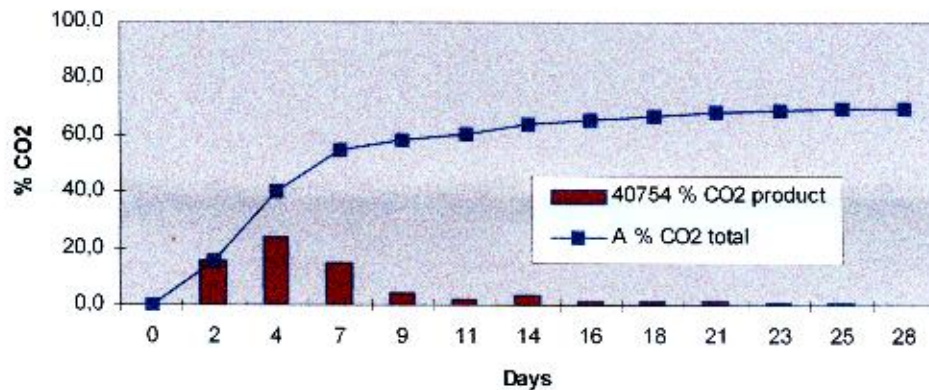
Day n°	40754	A	40754	B
	% CO2 product	% CO2 total	% CO2 product	% CO2 total
0	0,0	0,0	0,0	0,0
2	15,8	15,8	16,2	16,2
4	24,1	39,9	17,9	34,1
7	14,8	54,7	19,4	53,5
9	4,1	58,8	8,4	61,9
11	2,0	60,8	4,5	66,5
14	3,2	63,9	4,4	70,8
16	1,4	65,3	1,1	72,0
18	1,6	66,9	1,3	73,2
21	1,2	68,1	1,7	74,9
23	0,7	68,8	1,2	76,1
25	1,0	69,8	1,4	77,4
28	0,0	69,8	0,2	77,6

GRAPHIC ANALYSIS

Biodegradation of reference



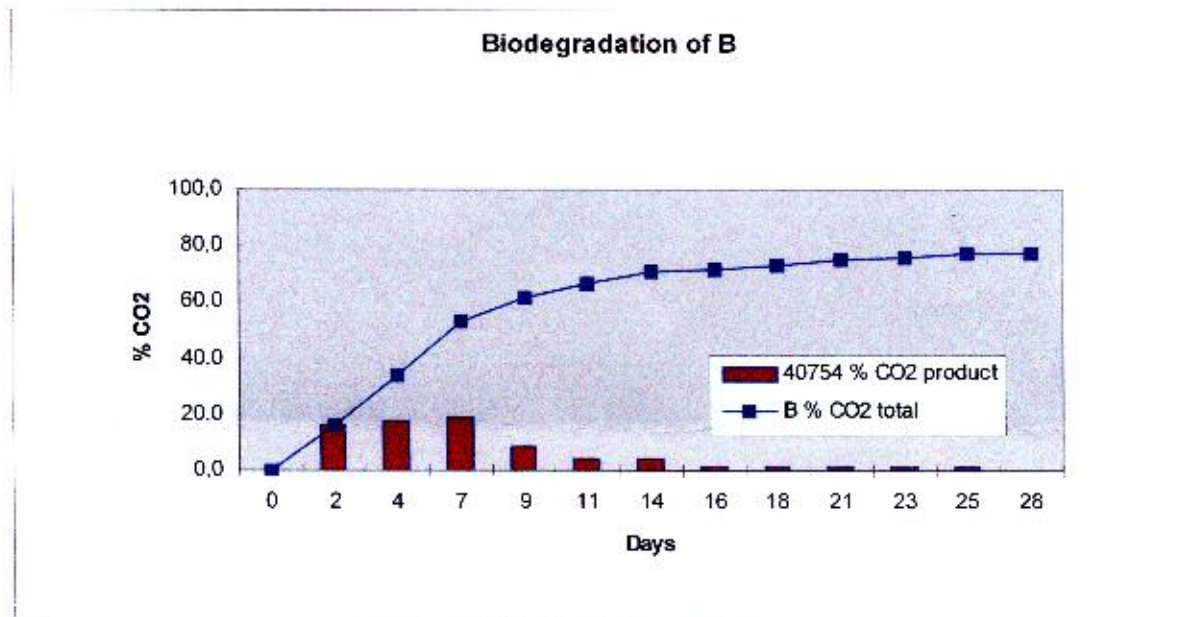
Biodegradation of A



Observation : Ce rapport ne peut être reproduit ou tellement, ni utilisé ni mentionné dans un but de publicité que qu'il soit, sans l'approbation écrite de la direction de BFB.
 Ce rapport d'essai est d'ailleurs uniquement valable pour la société mandante et ne concerne que les échantillons soumis à l'essai.
 Aanmerking : Dit rapport mag niet gebruikt, noch vermeld worden voor om het even welke reclame doeleinden, zonder voorafgaandelijk goedkeuring van de directie van BFB.
 Dit rapport is enkel geldig voor de door ons geanalyseerde monsters en alleen bruikbaar door de lastgever.
 Remark : This report may not be reproduced even partially, nor be used or mention be made in publicity without written approval from BFB director.
 This report concerns exclusively sample and is only dedicated to the constituent.

Rapport d'essai :
 Test verslag : NO40754.01.01
 Test report :

page: 6/8



Observation : Ce rapport ne peut être reproduit partiellement, ni utilisé et mentionné dans un but de publicité quelconque, sans l'approbation écrite de la direction de BFB.
 Ce rapport d'essai est d'ailleurs uniquement valable pour la société mandante et ne concerne que les échantillons soumis à l'essai.

Aanmerking : Dit rapport mag noch gebruikt, noch vermeld worden voor om het even welke reclame doeleinden, zonder voorafgaandelijke goedkeuring van de directie van BFB.
 Dit rapport is enkel geldig voor de door ons geanalyseerde monsters en alleen bruikbaar door de lastgever.

Remark : This report may not be reproduced even partially, nor be used or mention be made in publicity without written approval from BFB director.
 This report concerns exclusively sample and is only dedicated to the constituent.

METHOD

Test Principle: A clearly chemically defined medium, without any other organic carbon sources, is mixed up to the substance to be examined. Then micro-organisms issued from mud are added.

Finally the released CO₂ is trapped under the BaCO₃ compound. After comparison to the control results, the amount of CO₂ product is determined and expressed in percent of CO₂ theoretically linked to the TOC.

Aim: the aim of this experiment is to qualify a chemical as easily biodegradable if according to this test the CO₂ released is higher than 60% (within 28 days).

Substances: 1. Stock solutions for the test (in 1 litre of High Quality Water)

- *4 ml Fe Chloride solution
- *1 ml Mg Sulphate solution
- *1 ml Ca Chloride solution
- *2 ml Phosphate solution (to regulate the pH)

(HQW: water containing a tiny amount of carbon < 2,0 mg/l, no toxic substances and a resistivity >18)

2. Organisms issued from mud

3. Ba(OH)₂ 0,025 N

4. HCl 0,05 N

Apparatus: 1. To catch the CO₂

- *4 plastic flasks of 1 litre filled with 700 ml of NaOH 10N
- *1 erlenmeyer of 1 litre filled with 700 ml of Ba(OH)₂ 0.025N
- *1 emptied erlenmeyer of 1 litre to avoid overflow.

Using Tygon tubes, join the flasks together to a compressed air source and inject the air with a constant debit in the solutions.

2. To measure the production of CO₂

- *4 red containers of 5 litres
- *caps, flexible and plastic tubes
- *100 ml flasks to absorb CO₂ in the Ba(OH)₂.

3. To analyse

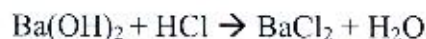
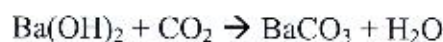
- *a 10 ml burette for HCl.

Test conditions: 3 litres of solution test with 30 ml of inoculum, the system has to be purged with air containing no CO₂ for 24 hours before adding sample (± 20 mg C/l) and then connected to absorption flasks.

Outlines of the method: At room temperature

1. Begin with bubbling air exempt of carbon dioxide in the solution using a debit of 50 to 100 ml/min. The produced CO₂ reacts with Ba(OH)₂ to give a precipitate of Barium carbonate. Then the produced CO₂ can be determinate in titration the remaining Ba(OH)₂ with HCl and phenolphthalein. In this context, every 2 days, the closest to the container flask has to be removed and a new one has to be added at the end of the queue (the first two flasks have been put closest to the container). The titration have to be carried out every two days for the first 10 days and every five days until the day 28.
2. The day 26, the pH of the solution in the container has to be measured, then 1 ml of concentrated HCl has to be added to the container in order to eliminate the inorganic carbonate. Do the final titration the day 28.

Results: The produced CO₂ is given as a percent using a corrector factor (due to CO₂ released by the organisms). The produced CO₂ is obtained according to the reactions:



Then, mg CO₂ product = ml HCl * 1,1

Finally: % CO₂ total = (mg CO₂ product / TOC) * 100

Expressed as % **Biodegradability.**

Dr François Van Dievoet,
Managing Director.

Vincent Bouillon,
Laboratory Manager.

Steve Louvat,
Chemist.