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## REPORT ON THE ANALYSIS OF SAMPLES RECEIVED 4/04/2023

### INTRODUCTION

One (1) sample identified below was received on 4/04/2023 from Sustainable Rubber Technologies Pty Ltd. A determination of biodegradability was requested, this was undertaken using OECD method 301D: Closed Bottle Test.

### METHODS

| Material | Analyte(s)             | Method Code |
|----------|------------------------|-------------|
| Solid    | Ready biodegradability | OECD 301D   |

### SAMPLE IDENTIFICATION

| ChemCentre No. | Sample Marks       | Matrix | Date Received |
|----------------|--------------------|--------|---------------|
| 22S3652/001    | Musty 2009 Product | Solid  | 4/4/2023      |

The results are shown in the following page(s).

*These results apply only to the sample(s) as received and with the caveats noted above. Results may not be reproduced except in full.*



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 17/05/2023

## OECD method 301D: Ready Biodegradability by the Closed Bottle Test

### General Principle

A suspension of the test substance in a mineral medium is inoculated and incubated under aerobic conditions in the dark. Degradation of the organic carbon in the test substance is measured by the determination of oxygen uptake (dissolved oxygen, DO), and the biological oxygen demand (BOD) is calculated. Measurements are taken at sufficiently frequent intervals to allow the identification of the beginning and end of biodegradation.

### Test Conditions

The test substance was suspended in the inoculum in sealed BOD bottles with no air gap. The inoculum was effluent from a wastewater treatment plant: this was untreated apart from sedimentation to remove solids. The reference substance (QC) was a mix of glucose and glutamic acid with a ThOD of 198 mg/L. The bottles were incubated for 5, 9, 14, 21, and 28 days at 20°C.

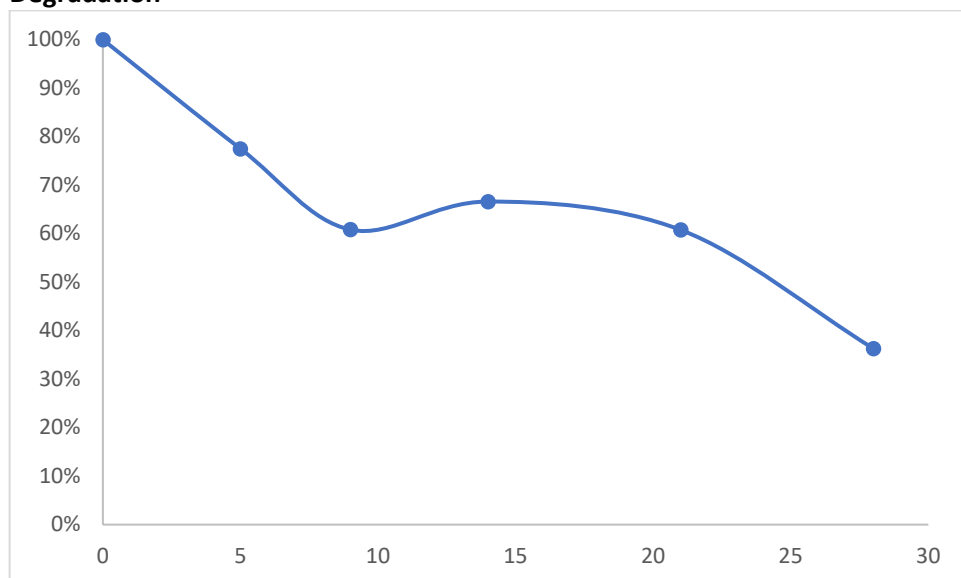
### Results

Because the test material was insufficiently defined, it was not possible to calculate the theoretical oxygen demand (ThOD) of the substance. Instead, the chemical oxygen demand (COD) was used to calculate the percentage degradation. COD was measured by closed reflux colourimetric method as 437,000 mg/kg.

| Incubation Period | Sample Type       | Date       | Weight of Sample (g) | Initial DO (mg/L) | Final DO (mg/L) | BOD (mg/kg) | % Degradation |
|-------------------|-------------------|------------|----------------------|-------------------|-----------------|-------------|---------------|
| 5 days            | Inoculum Blank    | 18/07/2022 |                      | 8.90              | 7.83            |             |               |
|                   | Inoculum Blank    | 18/07/2022 |                      | 8.89              | 7.84            |             |               |
|                   | Inoculum + QC     | 18/07/2022 | 6.00                 | 8.91              | 3.58            | 214         |               |
|                   | Inoculum + QC     | 18/07/2022 | 6.00                 | 8.91              | 3.71            | 207         |               |
|                   | Inoculum + Sample | 18/07/2022 | 0.0744               | 8.89              | 0.21            | 30700 *     | 22%           |
|                   | Inoculum + Sample | 18/07/2022 | 0.0260               | 8.90              | 1.11            | 77800       |               |
|                   | Inoculum + Sample | 18/07/2022 | 0.00768              | 8.90              | 4.80            | 119000      |               |
| 9 days            | Inoculum Blank    | 22/07/2022 |                      | 8.90              | 7.71            |             |               |
|                   | Inoculum Blank    | 22/07/2022 |                      | 8.89              | 7.91            |             |               |
|                   | Inoculum + Sample | 22/07/2022 | 0.0751               | 8.89              | 0.22            | 30300 *     | 39%           |
|                   | Inoculum + Sample | 22/07/2022 | 0.0226               | 8.90              | 0.38            | 98900 *     |               |
|                   | Inoculum + Sample | 22/07/2022 | 0.00742              | 8.93              | 3.61            | 171000      |               |
| 14 days           | Inoculum Blank    | 27/07/2022 |                      | 8.89              | 7.46            |             |               |
|                   | Inoculum Blank    | 27/07/2022 |                      | 8.89              | 7.67            |             |               |
|                   | Inoculum + Sample | 27/07/2022 | 0.0750               | 8.89              | 0.24            | 29300 *     | 33%           |
|                   | Inoculum + Sample | 27/07/2022 | 0.0250               | 8.90              | 0.26            | 87700 *     |               |
|                   | Inoculum + Sample | 27/07/2022 | 0.00729              | 8.90              | 4.03            | 146000      |               |
| 21 days           | Inoculum Blank    | 3/08/2022  |                      | 8.88              | 7.31            |             |               |
|                   | Inoculum Blank    | 3/08/2022  |                      | 8.88              | 7.36            |             |               |
|                   | Inoculum + Sample | 3/08/2022  | 0.0757               | 8.86              | 0.25            | 28000 *     | 39%           |
|                   | Inoculum + Sample | 3/08/2022  | 0.0230               | 8.86              | 0.24            | 92200 *     |               |
|                   | Inoculum + Sample | 3/08/2022  | 0.00692              | 8.87              | 3.37            | 171000      |               |
| 28 days           | Inoculum Blank    | 10/08/2022 |                      | 8.87              | 6.95            |             |               |
|                   | Inoculum Blank    | 10/08/2022 |                      | 8.87              | 7.35            |             |               |
|                   | Inoculum + Sample | 10/08/2022 | 0.0757               | 8.86              | 0.26            | 27300 *     | 64%           |
|                   | Inoculum + Sample | 10/08/2022 | 0.0250               | 8.87              | 0.25            | 82900 *     |               |
|                   | Inoculum + Sample | 10/08/2022 | 0.00748              | 8.88              | 0.22            | 278000      |               |

Note: measurements in *italics* have a DO less than 0.5 mg/L and are therefore unreliable due to the potential limitation of inoculum activity. These numbers have been removed from the calculation of total biodegradation. The final value also has a DO less than 0.5 mg/L, and it is possible that the 28-day result is underestimated.

## Degradation



The reference material achieved complete degradation in 5 days, and no inhibition was observed. The lag phase (time taken until degradation has increased to 10%) was less than 5 days.

The final degradation of the substance at 28 days was at least 64%.

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## **ANALYSIS OF OIL ABSORBENT**

### **EXECUTIVE SUMMARY**

ChemCentre were requested by Sustainable Rubber Technologies to perform a dynamic degradation test on an adsorbent sample and three test oils (14% weathered Kuwait Crude, IFO 180 and IFO 380), following method ASTM F726-17.

## INTRODUCTION

Testing was done according to method ASTM F726-17 section 9.2.2, the dynamic degradation test for a type II adsorbent. About 10 g of sample is weighed out and added to a 4 L jar containing 2 L of water. The jar is sealed and placed on its side on a shaker table for 15 min. The contents of the jar are left to settle for 2 minutes before observing the condition of the adsorbent and the water.

If 10% or more of the adsorbent has sunk, then the adsorbent fails the test.

The contents are strained through a mesh sieve (pre-weighed) and allowed to drain for 30 seconds before being weighed. These weights are used to calculate the water pick-up ratio.

The jar is again half-filled with fresh water and 3 mL of test oil is added before the sample is returned to the jar. It is placed back onto the shaker table for 15 minutes, then allowed to settle for 2 minutes. During this time observations are noted, including the quantity of adsorbent submerged, physical appearance of adsorbent and water, any residual sheen, and any other observations that may be relevant.

## SAMPLE IDENTIFICATION

Sustainable Rubber Technologies supplied ChemCentre with one sample of Oil Adsorbent on 24 August 2020.

ChemCentre supplied the three test oils required: Kuwait crude oil (weathered to 85% of its original weight), IFO 180, and IFO 380.

## RESULTS

### Water Pick-up

The water pick-up ratio is calculated as a ratio of water adsorbed to dry adsorbent weight.

| Sample ID          | Water pick-up ratio |
|--------------------|---------------------|
| 20S0771/001 Test A | 4.2 g/g             |
| 20S0771/001 Test B | 5.4 g/g             |
| 20S0771/001 Test C | 5.7 g/g             |
| Average:           | 5.1 g/g             |

No adsorbent material sank during this portion of the test.

### Addition of oil

Three different oils were used for this test: Test A with a 15% Weathered Kuwait Crude oil, Test B with IFO 180 and Test C with IFO 380. For all 3 samples the observations were very similar.

No adsorbent sank during the test.

For all three oils the water stayed clear, with a large percentage of the oil either adsorbed by the product (Kuwait crude and IFO180) or stuck to the glass walls of the test vessel (IFO380) by the end of the test.



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1 September 2020