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TRADE SECRET

Study Title

EVALUATION OF THE BIODEGRADABILITY OF C-8 USING THE MODIFIED STURM TEST (OECD 301 B)

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GENERAL INFORMATION

Material Tested: C-8

Synonyms/Codes: None

Submitter's Notebook No.: N/A

Sponsor: Roger Zipfel
FLPR
Washington Works

Experimental Start & Completion: 1/21/97 to 3/11/97

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EVALUATION OF THE BIODEGRADABILITY OF C-8 USING THE MODIFIED STURM TEST (OECD 301 B)

SUMMARY

The test chemical - C-8 - was tested for biodegradability using the Modified Sturm Test. Within the 28-day test period, C-8 reached a peak of 13 % at Day 28. Since the *"PASS"* criteria for the Modified Sturm Test is 60 % biodegradability in a 10 day window within the 28 day test period, it may be concluded that **C-8 did not demonstrate "Ready Biodegradability".**

Please note that failure to pass a "Ready Biodegradability Test" does not imply that the test material will persist in the environment for an extended period of time. Furthermore, evaluation of the individual components of the formulation would yield more specific information on the biodegradability potential of C-8.

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Senior Research Microbiologist

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Introduction/Purpose

The Modified Sturm Test was performed to determine the biodegradability of the test material, C-8.

The Modified Sturm Test can be used for either water-soluble or water-insoluble and non-volatile chemicals. In this test, biodegradability is measured as CO_2 evolution. When bacteria biodegrade an organic chemical in an aerobic system, the end product of the metabolism is carbon dioxide. Therefore, carbon dioxide evolution is indicative of a chemical being biodegraded. If CO_2 evolution is greater than 60 %, then Ready Biodegradability has been demonstrated and no further testing is necessary. This "PASS" value must be reached in a 10-day window within the 28 day period of the test. The 10 day window begins when the degree of biodegradation has reached 10 % $ThCO_2$, and must end before day 28 of the Modified Sturm Test.

Materials/Methods

The Modified Sturm Test determination was conducted in accordance with AEM SOP MI056-P: Modified Sturm Test. See Table 1 for materials tested. Activated sludge collected from the City of Wilmington, DE POTW was used as the inoculum.

Results/Discussion

In the Modified Sturm Test, C-8 reached a peak of 13 % at Day 28 (Table 2 and Figure 1). Therefore, it may be concluded that "Ready Biodegradability" was not demonstrated.

Please note that failure to pass a "Ready Biodegradability Test" does not imply that the test material will persist in the environment for an extended period of time. Furthermore, evaluation of the individual components of the formulation would yield more specific information on the biodegradability potential of C-8.

The reference chemical, sodium benzoate, exceeded 60 % biodegradability within 14 days, therefore the biodegradability test was considered valid (Table 2 and Figure 1). The Theoretical CO_2 Produced was 0.24 mg CO_2 per mg of 30 % C-8.

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The toxicity test (which includes both the test chemical and the reference chemical in the same flask) yielded less than 25 % biodegradation within 14 days, therefore C-8 was considered as inhibitory to microorganisms in the inoculum.

Path Forward Discussion

If it can be assumed that the 30 % C-8 solution was essentially pure with only trace levels of impurities, then there may be a possibility that the terminal carbon (COO^-) may have been biodegraded by the microorganisms. As a path forward, we will repeat the experiment to determine if we have reproducible results. The Modified Sturm Test is used to determine biodegradability of organic chemicals by measuring the amount of CO_2 evolved without using ^{14}C labelled carbon. Therefore, the analysis is non-specific and it is not possible to conclusively determine which carbon was attacked by the microorganisms.

If reproducible results are observed upon repeating the Modified Sturm Test, then it is recommended that a follow-up biodegradability test should be conducted with ^{14}C labelled carbon on the terminal C (COO^-) of C-8. This will allow for the conclusive determination as to whether the terminal carbon of C-8 is biodegraded.

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TABLE 1

Description of Test and Control Substances

Test Substance Description
C-8 Sodium Benzoate

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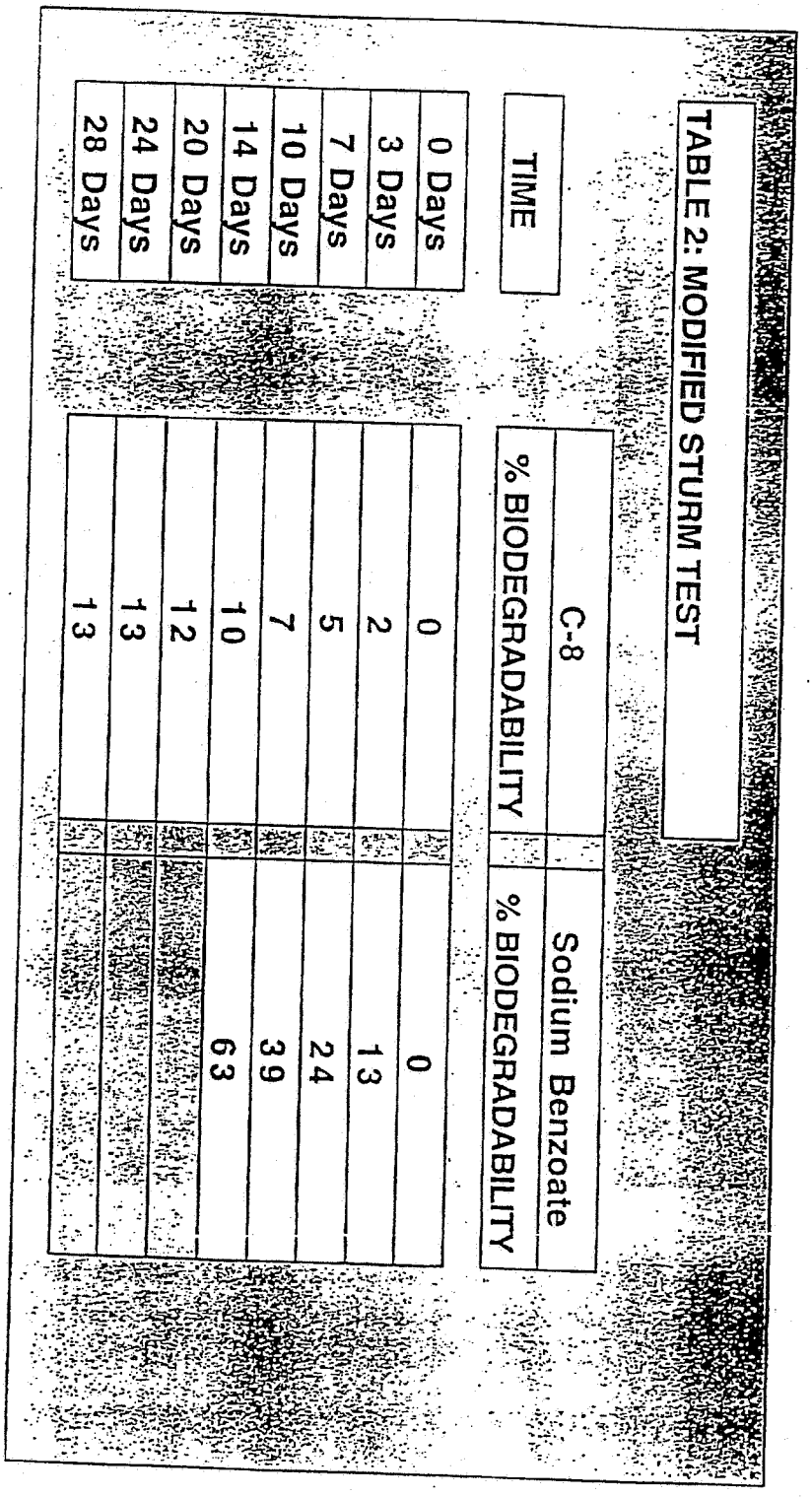

TABLE 2: MODIFIED STURM TEST

TIME	C-8 % BIODEGRADABILITY	Sodium Benzoate % BIODEGRADABILITY
0 Days	0	0
3 Days	2	13
7 Days	5	24
10 Days	7	39
14 Days	10	63
20 Days	12	
24 Days	13	
28 Days	13	

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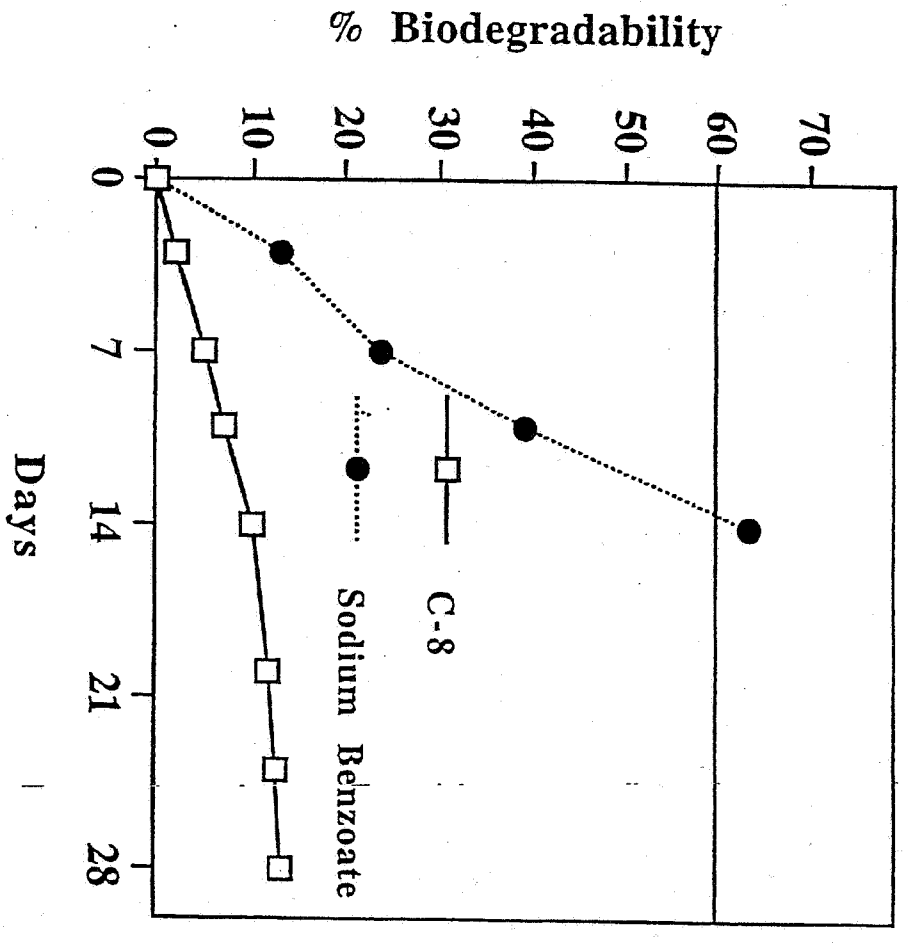

Figure 1: Modified Sturm Test

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