



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue, SE  
Washington, DC 20590

November 30, 2023

Mr. Gavin Kahn  
President  
Carbochem Inc.,  
308 East Lancaster Ave  
Wynnewood, PA 19096

Reference No. 23-0058

Dear Mr. Kahn:

This letter is in response to your June 28, 2023, email pertaining to activated carbon transported in accordance with the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). In your email, you note that chemically-activated carbon is often shipped as a Division 4.2 (Spontaneously Combustible Material) material due to its self-heating properties. To determine the classification of your product, you arranged for your Carbochem® activated carbon grades to be tested using United Nations (UN) Test N.4 “Test method for self-heating substances,” in accordance with Section 33.3.1.6 of the UN Manual of Test and Criteria (UNMTC). You state that the results of the testing—as provided in your email—indicate that Carbochem® DC-50 (steam activated) exhibits no self-heating; while Carbochem® CA-50 (chemically activated) shows some self-heating, but not at 140 °C with a 25mm cube sample. You ask for confirmation that your test results accurately determine that your Carbochem products should not be classified as Division 4.2 hazardous materials.

In accordance with § 173.22 of the HMR, it is the shipper's responsibility to properly classify a hazardous material. This Office generally does not perform this function. However, based on the test data and certification you provided, we agree that your company's products—as described in your email—do not meet the definition of a Division 4.2 hazardous material. Accordingly, if your products do not meet any other hazard class as defined in part 173 of the HMR, and are not a hazardous substance, hazardous waste, or marine pollutant, they are not subject to the HMR.

I hope this information is helpful. Please contact us if we can be of further assistance.

Sincerely,

T. Glenn Foster  
Chief, Regulatory Review and Reinvention Branch  
Standards and Rulemaking Division

**From:** [INFOCNTR \(PHMSA\)](#)  
**To:** [Dodd, Alice \(PHMSA\)](#)  
**Cc:** [Hazmat Interps](#)  
**Subject:** FW: Letter of Interpretation Request for Activated Carbon  
**Date:** Friday, June 30, 2023 3:05:06 PM  
**Attachments:** [image001.png](#)  
[Self Heating test per UN N.4 using Procedure 33.3.1.6 2023.pdf](#)  
[Self Heating Result for Test UN N.4 - Carbochem DC-50 2-23.pdf](#)  
[Self Heating Result for Test UN N.4 - Carbochem CA-50 2-23.pdf](#)  
**Importance:** High

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Hello Alice,

Please see the below and attached interpretation requests.

Let me know if you need anything else.

Regards,

-Breanna

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**From:** Gavin Kahn <Gavin.Kahn@carbochem.com>  
**Sent:** Wednesday, June 28, 2023 9:54 AM  
**To:** INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov>  
**Cc:** CARBOCHEM <HQ@carbochem.com>  
**Subject:** Letter of Interpretation Request for Activated Carbon  
**Importance:** High

**CAUTION:** This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

To Whom it May Concern:

I have been working with Commissioner Carl Bentzel from the FMC regarding an issue with the major shipping carriers that has been a problem for quite some time.

Background: Primary uses of Activated Carbon are purification of drinking water (Municipal water treatment plants and beverage companies such as Coca-Cola and Pepsi) and decolorizing food products such as sugar and other sweeteners, fruit juice, citric acid, MSG etc. Obviously, the grades of Activated Carbon for these applications are all Food Grade quality.

The United Nations has classified Activated Carbon produced by Chemical Activation to be a Division 4.2 material because it exhibits self-heating properties and thus UN1362 was applied to the product to designate this. The shipping lines used this as justification to charge a freight premium on Activated Carbon as it was deemed dangerous cargo (also permitting the carrier s to cancel freight bookings at their whim). They also applied this classification to Activated Carbon produced by Steam Activation which is not valid, so they

could benefit from greater revenues.

We arranged for a reputable laboratory with the necessary expertise to perform the self-healing UN Test N.4 according to procedure Section 33.3.1.6, UN 2009 to determine if our activated carbon products should be classified in Division 4.2. The results are attached for our specific Carbochem® grades which confirm that our activated carbon should not be classified in Division 4.2. The conclusion is based on the following analysis (test method attached):

- Carbochem® DC-50 (coal based, steam activated carbon, acid washed): No self-heating detected for basic test at 140° C.
- Carbochem® CA-50 (wood based activated carbon, chemically activated): Self-heating detected at 140° C but not at 140° C with a 25 mm cube sample. Packing Group II restriction not required as the packing size is less than 3 cubic meters volume.

While we cannot speak for other grades of Activated Carbon, our grades are produced with proprietary technology to ensure that they are exempt from Division 4.2 Classification, but the shipping lines refuse to accept this.

Please advise how we can obtain a DOT/PHMSA letter of interpretation for clarification on the federal process for classification of Activated Carbon.

Sincerely,

*Gavin Kahn*

President

Carbochem Inc,

308 East Lancaster Ave

Wynnewood,

PA 19096

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Fax: (610)645-5501

E-Mail: [Gavin.Kahn@carbochem.com](mailto:Gavin.Kahn@carbochem.com)



## CERTIFICATE OF ANALYSIS

Client:	Carbochem Inc. 308 E. Lancaster Ave, Wynnewood PA 19096 USA	Work Order:	23MIS090
		Date Received:	January 19, 2023
		Date Analyzed:	January 26-30, 2023
		Date Reported:	February 1, 2023
Requested By:	Gavin Kahn	Analysis:	Self-Heating Test
Client's reference:	Self Heating Regulation per UN	Reference Procedure:	UN Test N.4. Paragraph. 33.3.1.6, UN 2009

Sample Description: Powder Activated Carbon, CA50

Laboratory sample ID: 23MIS090-SH1

### Results:

Sample Size (mm)	Oven Temperature (°C)	Maximum Observed Sample Temperature in the sample core (°C)	Observations	Result
100 x 100 x 100	140	304 <sup>1)</sup>	No smoke or smoldering	Self-Heating is detected
25 x 25 x 25	140	140	No smoke or smoldering	Self-Heating is not detected
100 x 100 x 100	120	124	No smoke or smoldering	Self-Heating is not detected

### Comments:

- 1) The test was stopped after the positive self-ignition
- UN defines positive Self Heating test in paragraph 33.3.1.6.4.1, as a test where the Maximum Observed Temperature in the sample core exceeds the oven temperature by 60°C.

### Note:

- Test duration is 24 hours unless the sample shows the self-ignition properties
- Accuracy of the temperature reading is 1°C.
- Sample is tested in "as received" form
- Test results pertain only to analysis of samples herein reported.



Analyst: Stepan Reut, Ph.D.



Reviewer: Raisa Stadnichenko, Ph.D.

## CERTIFICATE OF ANALYSIS

Client:	Carbochem Inc. 308 E. Lancaster Ave, Wynnewood PA 19096 USA	Work Order:	23MIS090
		Date Received:	January 19, 2023
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		Date Reported:	February 1, 2023
Requested By:	Gavin Kahn	Analysis:	Self-Heating Test
Client's reference:	Self Heating Regulation per UN	Reference Procedure:	UN Test N.4. Paragraph. 33.3.1.6, UN 2009

Sample Description: Granular Activated Carbon, DC50

Laboratory sample ID: 23MIS090-SH2

### Results:

Sample Size (mm)	Oven Temperature (°C)	Maximum Observed Sample Temperature in the sample core (°C)	Observations	Result
100 x 100 x 100	140	151	No smoke or smoldering	Self-Heating is not detected

### Comments:

- UN defines positive Self Heating test in paragraph 33.3.1.6.4.1, as a test where the Maximum Observed Temperature in the sample core exceeds the oven temperature by 60°C.

### Note:

- Test duration is 24 hours unless the sample shows the self-ignition properties
- Accuracy of the temperature reading is 1°C.
- Sample is tested in "as received" form
- Test results pertain only to analysis of samples herein reported.



Analyst: Stepan Reut, Ph.D.



Reviewer: Raisa Stadnichenko, Ph.D.

33.3.1.6 **Test N.4: Test method for self-heating substances**

33.3.1.6.1 Introduction

The ability of a substance to undergo oxidative self-heating is determined by exposure of it to air at temperatures of 100 °C, 120 °C or 140 °C in a 25 mm or 100 mm wire mesh cube.

33.3.1.6.2 Apparatus and materials

The following apparatus is required:

- a) a hot-air circulating type of oven with an inner volume of more than 9 litres and capable of controlling the internal temperature at 100 °C, 120 °C or 140 °C  $\pm$  2 °C;
- b) cubic sample containers of 25 mm and 100 mm side, made of stainless steel net with a mesh opening of 0.05 mm, with their top surface open; and
- c) Chromel-Alumel thermocouples of 0.3 mm diameter; one placed in the centre of the sample and another between the sample container and the oven wall.

Each sample container should be housed in a cubic container cover made from a stainless steel net with a mesh opening of 0.60 mm, and slightly larger than the sample container. In order to avoid the effect of air circulation, this cover is installed in a second stainless steel cage, made from a net with a mesh size of 0.595 mm and 150 × 150 × 250 mm in size.

33.3.1.6.3 Procedure

The sample, powder or granular, in its commercial form, should be filled to the brim of the sample container and the container tapped several times. If the sample settles, more is added. If the sample is heaped it should be levelled to the brim. The container is housed in the cover and hung at the centre of the oven. The oven temperature should be raised to 140 °C and kept there for 24 hours. The temperature of the sample and of the oven should be recorded continuously. The first test<sup>1</sup> may be conducted with a 100 mm cube sample. A positive result is obtained if spontaneous ignition occurs or if the temperature of the sample exceeds the oven temperature by 60 °C. If a negative result is obtained, no further test is necessary. If a positive result is obtained, a second test should be conducted at 140 °C with a 25 mm cube sample to determine whether or not packing group II should be assigned. If a positive result is obtained at 140 °C with the substance in a 100 mm sample cube, but not a 25 mm sample cube, then an additional test with the substance in a 100 mm sample cube should be performed:

- (a) At 120 °C if the substance is to be transported in packagings of more than 450 litre volume but not more than 3 m<sup>3</sup> volume; or
- (b) At 100 °C if the substance is to be transported in packagings of not more than 450 litres volume.

33.3.1.6.4 Test criteria and method of assessing results

33.3.1.6.4.1 A positive result is obtained if spontaneous ignition occurs or if the temperature of the sample exceeds the oven temperature by 60 °C during the 24 hour testing time. Otherwise, the result is considered negative.

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<sup>1</sup> The tests may be performed in any order. For example, if it is expected that a positive result will be obtained using a 25 mm cube sample then, for safety and environmental protection, the first test may be performed with a 25 mm cube sample. If a positive result is obtained with a 25 mm cube sample then a test with a 100 mm cube sample is not necessary.



## 33.3.1.6.4.2 A substance should not be classified in Division 4.2 if:

- (a) A negative result is obtained in a test using a 100 mm cube sample at 140 °C;
- (b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a negative result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be transported in packages with a volume not more than 3 m<sup>3</sup>;
- (c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a negative result is obtained in a test using a 100 mm cube sample at 100 °C and the substance is to be transported in packages with a volume not more than 450 litres.

33.3.1.6.4.3 Packing group II should be assigned to self-heating substances which give a positive result in a test using a 25 mm sample cube at 140 °C.

33.3.1.6.4.4 Packing group III should be assigned to self-heating substances if:

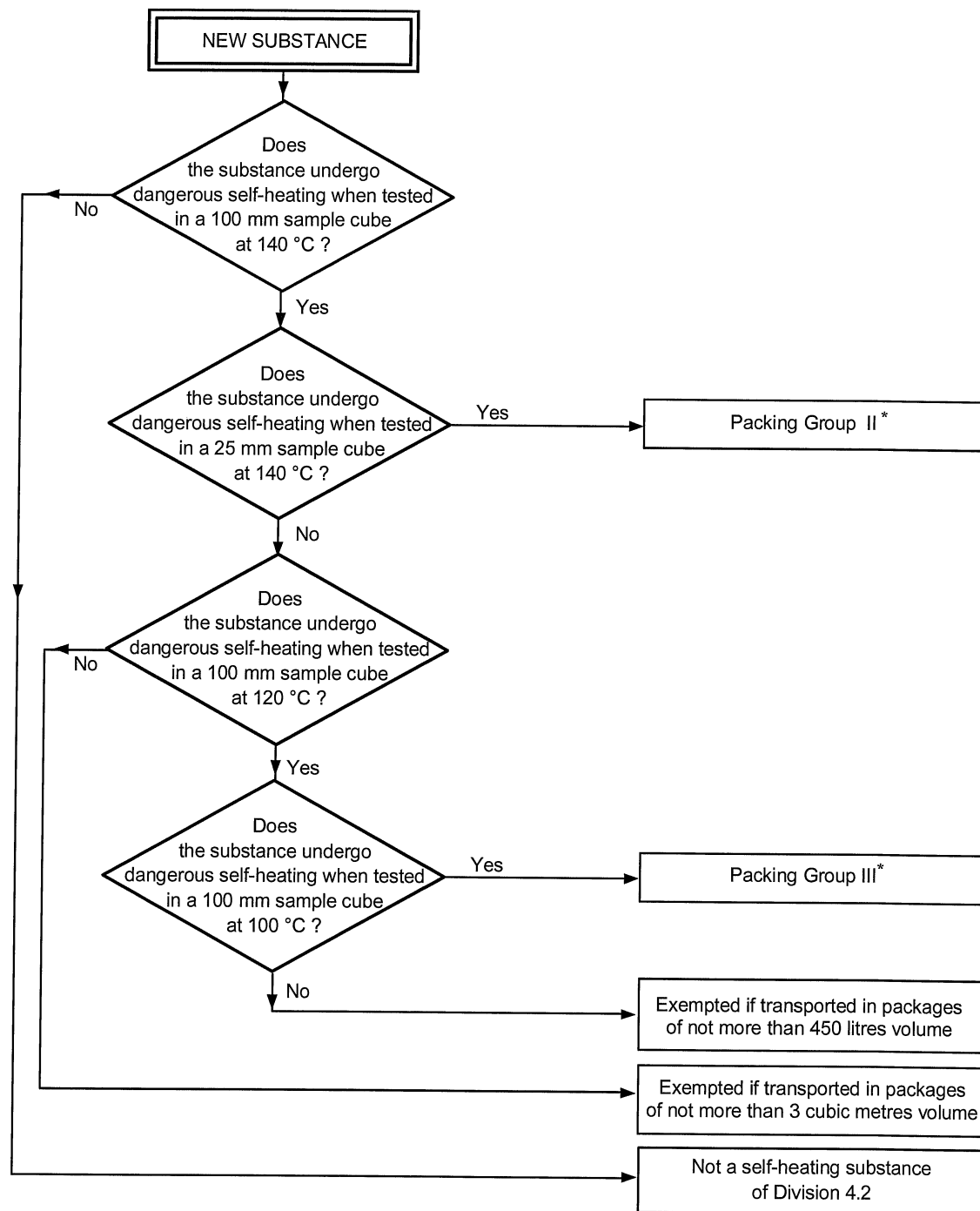
- (a) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and the substance is to be transported in packages with a volume of more than 3 m<sup>3</sup>;
- (b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a positive result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be transported in packages with a volume of more than 450 litres;
- (c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and a positive result is obtained in a test using a 100 mm cube sample at 100 °C.

## 33.3.1.6.5 Examples of results

Substance	Oven temperature (°C)	Cube size (mm)	Maximum temperature reached (°C)	Result
Cobalt/molybdenum catalyst granules	140	100	>200	P.G. III of 4.2 <sup>a</sup>
	140	25	181	
Manganese ethylene bis (dithiocarbamate) 80% (Maneb)	140	25	> 200	P.G. II of 4.2
Manganese ethylene bis (dithiocarbamate) complex with zinc salt 75% (Mancozeb)	140	25	> 200	P.G. II of 4.2
Nickel catalyst granules with 70% hydrogenated oil	140	100	140	Not 4.2
Nickel catalyst granules with 50% white oil	140	100	> 200	P.G. III of 4.2 <sup>a</sup>
	140	25	140	
Nickel/molybdenum catalyst granules (spent)	140	100	> 200	P.G. III of 4.2 <sup>a</sup>
	140	25	150	
Nickel/molybdenum catalyst granules (passivated)	140	100	161	Not 4.2
Nickel/vanadium catalyst Granules	140	25	> 200	P.G. II of 4.2

<sup>a</sup> Not tested at 100 °C or 120 °C.

**Figure 33.3.1.3.3.1: CLASSIFICATION OF SELF-HEATING SUBSTANCES**



\* Substances with a temperature for spontaneous combustion higher than 50 °C for 27 m<sup>3</sup> should not be classified in Division 4.2.



