



U.S. Department  
of Transportation  
**Research and  
Special Programs  
Administration**

400 Seventh St., S.W.  
Washington, D.C. 20590

JUN 13 2001

Mr. James P. Ringo  
Technical and Regulatory Director  
Antimicrobial Division  
1818 West Lindsey, Suite C-180  
Norman, OK 73069

Ref. No. 01-0106

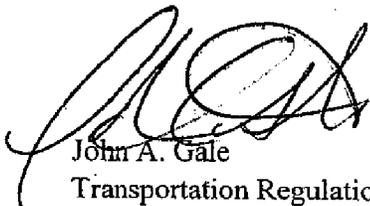
Dear Mr. Ringo:

This is in response to your letter and subsequent telephone conversations with Eric Nelson of my staff requesting clarification of the small quantity exceptions under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, you ask whether your packaging and inner receptacle qualifies for the small quantity provisions of § 173.4. The inner receptacle is comprised of a split-compartment poly-textile pouch that contains sodium chlorite solid in one compartment and anhydrous citric acid in the other compartment. This pouch is placed in a poly/foil/paper pouch, which is then placed in a polyethylene plastic bag.

A material may be transported under the small quantity exceptions if it is prepared in accordance with the quantity limits and packaging requirements in § 173.4, which includes the requirement that inner receptacles be made of plastic at least 0.008 inches thick, or glass, earthenware, or metal. Based on the information you submitted, we agree that your package may be transported under the small quantity exception provided the quantity of hazardous materials is less than 30 grams (1 ounce) and all other provisions in § 173.4 are met. Packing a nonhazardous material in excess of the 30 grams in the same package is permitted provided the package conforms with the requirements of § 173.21. Based on the information you submitted, we agree that a mixture of sodium chlorite solid and anhydrous citric acid is unlikely to produce dangerous quantities of chlorine dioxide gas under normal shipping conditions, and thus, would not be in violation of the prohibition in § 173.21(e).

I hope this information is helpful.

Sincerely,



John A. Gale  
Transportation Regulations Specialist  
Office of Hazardous Materials Standards



010106



April 27, 2001

Nelson  
§173.4  
Packaging  
01-0106

U.S. Department of Transportation  
Attention: Edward Mizzullo  
Office of Hazardous Material Standards  
Research and Special Programs Administration  
400 Seventh Street, S.W.  
Washington, D.C. 20590

Re: Request for an opinion regarding compliance with hazardous material regulations.

Dear Mr. Mizzullo:

Raytec Corporation requests an opinion regarding the transporting of certain hazardous materials. Specifically, is the transporting of sodium chlorite and citric acid in the same inner receptacle permitted under the provisions of 49 CFR 173.4, Small quantity exemptions, under material and packaging conditions which are described below?

Background: The use of an acidified sodium chlorite solution as an antimicrobial agent in seafood processing water is permitted by the Food and Drug Administration as described in 21 CFR 173.325, Acidified sodium chlorite solutions. To meet industry demand for this usage Raytec has developed and applied for a patent on a novel method to prepare acidified sodium chlorite solutions.

In brief, the Raytec development comprises a dual chambered sachet in a "teabag" configuration. One side of the teabag contains dry 80% technical grade sodium chlorite, the other side contains anhydrous food grade citric acid. The two dry chemicals are separated by an internal barrier. Upon immersion in water the barrier material exhibits a wicking action which draws water into the teabag. The water dissolves the sodium chlorite and citric acid which cross the barrier, combine, and react to form the acidified sodium chlorite solution which is subsequently diluted to the use concentration.

One important component of the acidified sodium chlorite solution is chlorine dioxide, CAS No. 10049-04-4, which is generally considered to be the efficacious antimicrobial component of the system. The generalized reaction of chlorite with an acid under aqueous conditions is shown in the following equation:



**HEADQUARTERS**

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Chlorine dioxide is a poisonous gas which is listed as forbidden in 49 CFR 172.101 Hazardous Materials Table, and may not be transported except as a frozen hydrate.

Raytec corporation believes that sodium chlorite and citric acid can be prepared and packaged under conditions which preclude the generation of dangerous quantities of chlorine dioxide even if the materials are mixed.

Description of the Raytec teabag chemicals and packaging materials:

1. Sodium chlorite. CAS No. 7758-19-2. Dry 80% technical grade sodium chlorite, manufactured by Vulcan Chemicals. An MSDS is provide as Attachment 1. Prior to packaging the sodium chlorite is heated to 150 °C for at least one hour to insure dryness.
2. Citrid acid. CAS No. 77-92-9. Food grade, anhydrous, citric acid manufactured by Tate & Lyle. An MSDS from the distributor is provided as Attachment 2.
3. Teabag. The teabag is comprised of three material layers, heat bonded together, which form a two compartment pouch. Samples of the teabag are provided and labeled as Attachment 4. The outer layers of the teabag are Tyvek Style 1079 with the physical characteristics described in Attachment 3. In accordance with 173.4 no more than thirty (30) grams of dry sodium chlorite are placed in one side of each bag. A total of four (4) grams of anhydrous citric acid are placed in the other pouch of each teabag.
4. Poly/Foil/Paper over wrap. The filled teabag is heat sealed inside the airtight polyfoil over wrap bag. A sample of the printed over wrap bag is provided and labeled as Attachment 5.
5. Polyethylene outer wrap bag. The outer wrap bag is made of 8 mil (0.008 in) polyethylene. The teabag and over wrap are heat sealed inside the polyethylene outer wrap bag. A sample of the outer wrap bag is provide at Attachment 6.
6. An unsealed assembly of the teabag, over wrap, and outer wrap are provided at Attachment 7 to aid in visualization of the completed inner packaging.
7. The outer packaging is a fiberboard box which has been tested in accordance with and meets all the standards of 49 CFR 173.4 A total of 32 of the inner packages are packaged in one fiberboard box outer package. The total weight of the completed package is less that eight pounds. A sample of the fiberboard box is not included, but will be provided if so requested.

Issue of concern: Raytec believes that the described packaging meets all of the requirements of 49 CFR 173.4 although we have one area of concern, specifically, 173.4 (a) (7) "Placement of the material in the package or packing different materials in the package does not result in a violation of 173.21."

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The issue of concern under 173.21 is (e) which states, "A material in the same packaging, freight container, or overpack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials"

*Summary*  
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Raytec has determined that the dried sodium chlorite and anhydrous citric acid, even if mixed, are unlikely to produce dangerous quantities of chlorine dioxide gas under normal shipping conditions. To determine this thirty gram samples of dried technical grade sodium chlorite were mixed with four grams of citric acid and placed in one side of test teabags. The teabags were then heat sealed inside the polyfoil over wrap bags and stored at ambient temperature for up to fourteen days. At Days 1, 3, 7, and 14 the over wrap bags were opened and chlorine dioxide concentration was determined by an Interscan chlorine dioxide monitor used in accordance with the manufacturers instructions. The fourteen day sample exhibited the low, but detectable, level of 3.07 ppm in the bag. Therefore, we believe that by using dried sodium chlorite and anhydrous citric acid, packaged as described above, the teabag product can be safely shipped in accordance with 49 CFR 173.4 and will not generate dangerous levels of chlorine dioxide even if mixed.

Raytec would appreciate your review and response to this request for an opinion to our question. If you have any questions or need for additional information on this subject please do not hesitate to call and let me know.

Sincerely,

*James P. Ringo*  
James P. Ringo  
Technical and Regulatory Director  
Antimicrobial Division

Enclosures: Seven, as stated

*Supporting data*  
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