Slip Op. 06 - 127

UNITED STATES COURT OF INTERNATIONAL TRADE

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DEGUSSA CORPORATION, :

Plaintiff, :

v. : Court No. 98-05-01598

UNITED STATES, :

Defendant. :

- x

Opinion

[Upon classification of certain synthetic silicon dioxide powders, judgment for the plaintiff.]

Decided: August 18, 2006

Barnes, Richardson & Colburn (Rufus E. Jarman and Kevin J. Sullivan) for the plaintiff.

Peter D. Keisler, Assistant Attorney General; Barbara S. Williams, Attorney in Charge, International Trade Field Office, Commercial Litigation Branch, Civil Division, U.S. Department of Justice (Bruce N. Stratvert); and Office of Assistant Chief Counsel, International Trade Litigation, U.S. Bureau of Customs and Border Protection (Chi S. Choy), of counsel, for the defendant.

AQUILINO, Senior Judge: This action, which has been designated a test case within the meaning of CIT Rule 84(b), causes the court to decide whether the Harmonized Tariff Schedule of the United States ("HTSUS") requires consideration of the surface chemistry of silicon dioxide in order to be classifiable as such

under HTSUS heading 2811 ("Other inorganic acids and other inorganic compounds of nonmetals"), in particular, subheading 2811.22.50 ("Silicon dioxide: . . . Other"), which substance enters free of duty.

In this test case, the U.S. Customs Service, as it was then still known, may have attempted to take that chemistry into account[1] in determining to classify plaintiff's goods under HTSUS heading 3824, to wit,

> Prepared binders for foundry molds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included; residual products of the chemical or allied industries, not elsewhere specified or included [. . .,]

subject to duty of 5 percent *ad valorem* per subheading 3824.90.90 (1997) thereunder. Whatever the Service's initial reasoning, a clear preponderance of the evidence adduced at trial confirmed that the merchandise is in fact silicon dioxide . . . other, produced synthetically, which defendant's expert witness characterized on direct examination as "marvelous products"[2].

I

Any doubt post trial herein is thus engendered by the law that governed their classification upon import. The gist

[1] Cf. Defendant United States' Proposed Findings of Fact and Conclusions of Law, Exhibit 1.

[2] Transcript of trial ("Tr."), p. 396. Cf. id. at 370.

of plaintiff's position is that HTSUS subheading 2811.22.50 is an *eo nomine* provision and that it is

> well established that [such] a . . . provision includes all forms of the named article unless limited by its terms, or contrary to legislative intent, judicial decisions, long standing administrative practice, or demonstrated commercial designation. . . . Neither the tariff, the legislative history nor judicial decision limit the application of Subheading 2811.22. As the tariff does not define the term "silicon dioxide", this Court should interpret such term to incorporate all forms of silicon dioxide that fall within the term's common and commercial meaning. . . . [T]he articles involved herein are forms of synthetic silicon dioxide and fall within both the common and commercial meaning of such term. . . .

Plaintiff's Post Trial Brief, pp. 6-7 (citations omitted).

HTSUS General Rule of Interpretation 1 is that classification shall be determined according to the terms of the chapter headings and any relative section or chapter notes. Note 1(a) provides that Chapter 28 applies only to separate chemical elements and separate chemically defined compounds, whether or not containing impurities. The general note to this chapter adds:

> A separate chemically defined compound is a substance which consists of one molecular species (e.g., covalent or ionic) whose composition is defined by a constant ratio of elements and can be represented by a definitive structural diagram. In a crystal lattice, the molecular species corresponds to the repeating unit cell.
>
> The elements of a separate chemically defined compound combine in a specific characteristic proportion determined by the valency and the bonding requirements of the individual atoms. The proportion of each element is constant and specific to each compound and it is therefore said to be stoichiometric.

> Small deviations in the stoichiometric ratios can occur because of gaps or insertions in the crystal lattice. These compounds are described as quasi-stoichiometric and are permitted as separate chemically defined compounds provided that the deviations have not been intentionally created.

Moreover, there are explanatory notes to the HTSUS which are not legally binding but which may be consulted for guidance and are generally indicative of the proper interpretation of its various provisions. See, e.g., Motorola, Inc. v. United States, 436 F.3d 1357, 1361 (Fed.Cir. 2006); Arbor Foods, Inc. v. United States, 30 CIT ___, ___, Slip Op. 06-74, p. 5 (May 17, 2006); Avenues in Leather, Inc. v. United States, 423 F.3d 1326, 1334 (Fed.Cir. 2005); Simon Marketing, Inc. v. United States, 29 CIT ___, ___, 395 F.Supp.2d 1280, 1287 (2005); Bauer Nike Hockey USA, Inc. v. United States, 393 F.3d 1246, 1250 (Fed.Cir. 2004); ABB, Inc. v. United States, 28 CIT ___, ___ and 346 F.Supp.2d 1357, 1361 n. 3 (2004); Park B. Smith, Ltd. v. United States, 347 F.3d 922, 929 n. 3 (Fed.Cir. 2003); Filmtec Corp. v. United States, 27 CIT ___, ___, 293 F.Supp.2d 1364, 1369 (2003); Jewelpak Corp. v. United States, 297 F.3d 1326, 1338 (Fed.Cir. 2002); Boen Hardwood Flooring, Inc. v. United States, 26 CIT 253, 257, 196 F.Supp.2d 1331, 1337 (2002); General Elec. Company-Medical Systems Group v. United States, 247 F.3d 1231, 1236 (Fed.Cir. 2001); Carrini, Inc. v. United States, 25 CIT 857, 860 (2001); JVC Co. of America v. United States, 234 F.3d

1348, 1352-53 (Fed.Cir. 2000); Ero Industries, Inc. v. United States, 24 CIT 1175, 1180, 118 F.Supp.2d 1356, 1360 (2000); Carl Zeiss, Inc. v. United States, 195 F.3d 1375, 1378 n. 1 (Fed.Cir. 1999); North American Processing Co. v. United States, 23 CIT 385, 2387 and 56 F.Supp.2d 1174, 1176 n. 5 (1999); EM Industries, Inc. v. United States, 22 CIT 156, 162, 999 F.Supp. 1473, 1478 (1998); Midwest of Cannon Falls, Inc. v. United States, 122 F.3d 1423, 1428 (Fed.Cir. 1997); H.I.M./Fathom, Inc. v. United States, 21 CIT 776, 779, 981 F.Supp. 610, 613 (1997); Verosol USA, Inc. v. United States, 20 CIT 1251, 1252 and 941 F.Supp. 139, 140 n. 5 (1996); Totes, Inc. v. United States, 69 F.3d 495, 500 (Fed.Cir. 1995); Marubeni America Corp. v. United States, 35 F.3d 530, 535 n. 3 (Fed.Cir. 1994); Beloit Corp. v. United States, 18 CIT 67, 80, 843 F.Supp. 1489, 1499 (1994); THK America, Inc. v. United States, 17 CIT 1169, 1175, 837 F.Supp. 427, 433 (1993); Lynteq, Inc. v. United States, 976 F.2d 693, 699 (Fed.Cir. 1992).

The explanatory notes to chapter 28, HTSUS confirm that silicon dioxide is an inorganic oxygen compound of a nonmetal and state further:

(M) **SILICON COMPOUNDS**

> **Silicon dioxide** (pure silica, silicic anhydride, etc.)(SiO_2). Obtained by treating silicate solutions with acids, or by decomposing silicon halides by the action of water and heat.

> It can be either in amorphous form (as a white powder "silica white", "flowers of silica", "calcined silica"; as vitreous granules - "vitreous silica"; in gelatinous condition - "silica frost", "hydrated silica"), or in crystals (tridymite and cristobalite forms).
>
> Silica resists the action of acids; fused silica is therefore used to make laboratory apparatus and industrial equipment which can be suddenly heated or cooled without breaking (see General Explanatory Note to Chapter 70). Finely powdered silica is used as an extender in the manufacture of paints and as a filler for lakes. Activated silica gel is employed to dry gases.
>
> The heading **excludes**:
>
> (a) Natural silica (**Chapter 25**, except varieties constituting precious or semi-precious stones - see the Explanatory Notes to **headings 71.03** and **71.05**).
>
> (b) Colloidal suspensions of silica are generally classified in **heading 38.24** unless specially prepared for specific purposes (e.g., as textile dressings of **heading 38.09**).
>
> (c) Silica gel with added cobalt salts (used as a humidity indicator)(**heading 38.24**).

Boldface in original.

A

The court's jurisdiction in this matter is based upon 28 U.S.C. §§ 1581(a), 2631(a), and the trial proceeded pursuant to a pretrial order that set forth the following as uncontested facts:

> 1. The word "silica" denotes the compound silicon dioxide, SiO_2, and encompasses various forms, including crystalline silicas, vitreous silicas and amorphous silicas.

2. The basic structural unit of silica is a tetrahedral arrangement of four oxygen atoms surrounding a central silicon atom. The SiO_2 stoichiometry requires that on average each oxygen must be shared by silicons in two tetrahedra.

3. Amorphous silicas include precipitated silicas, silica gels, and pyrogenic silicas.

4. Pyrogenic silicas, also known as fumed silicas, are fluffy white powders consisting of approximately spherically shaped particles.

5. Fumed silica is produced by flame hydrolysis of silicon tetrachloride ($SiCl_4$) in an oxygen-hydrogen gas flame. The result is an extremely fine particle of silicon dioxide. The by-product of this process is predominantly hydrogen chloride plus some water vapor.

6. Alternatively, the fumed silica can be produced by flame hydrolysis of organosilanes in an oxygen-hydrogen gas flame. In this case, carbon dioxide is a by-product.

7. Fumed silica particles form aggregates and larger, loose, network structures known as agglomerates.

8. The products at issue in this case are AEROSIL® R202, AEROSIL® R805, AEROSIL® R812, AEROSIL® R812S, AEROSIL® R972, AEROSIL® US202, AEROSIL® US204, AEROSIL® R104, and AEROSIL® R976.

9. The surface of silica contains two functional groups: siloxane groups and silanol groups (Si-OH) where the silanol groups arise from the interaction with water vapor.

10. Siloxane groups are largely inert chemically and have a mild hydrophobic nature in terms of being able to disperse in either water or organic solvents.

11. Silanol groups are “water attractive” and adsorb water vapor well. Thus, they are hydrophilic in nature.

12. Immediately after production of AEROSIL®, the silanol groups on the surface of the silica particle are mainly isolated. Upon exposure to water vapor, adsorbed water groups from the air react with strained siloxane groups and form bridged silanol groups.

13. Due to the presence of the silanol groups on the surface of silica particles, the standard AEROSIL® silica is hydrophilic.

14. To produce surface-treated silica, some of the silanol groups on the surface of the silica particle are reacted with silanes such as dimethyldichlorosilane, hexamethyldisilazane, trimethylozyoctylsilane or with silicone oil as part of the continuous, manufacturing process.

15. Surface treatment reduces the silanol groups to about 30% of the initial value, the exact amount depending on the surface treatment.

16. The products at issue are not separate chemical elements.

17. The compounds in issue are not quasi-stoichiometric.

What was confirmed or added at trial to these stipulated facts is that each AEROSIL® at issue is hydrophobic. See, e.g., Tr. at 63; Plaintiff's Exhibit 6, p. 40. Cf. Tr. at 137-39. Each is manufactured by flame hydrolysis of silicon tetrachloride in an oxygen-hydrogen gas flame. See id. at 19, 125; Plaintiff's Exhibit 6, p. 11 and Exhibit 20, p. 4. Each is at least 99.8 percent amorphous silicon dioxide. See Plaintiff's Exhibit 6, p. 79; Exhibit 19, second page; Exhibits 32, 33, 34, 35, 36, 37, 38, 39, 40. Compare Tr. at 82 with id. at 153-54 and at 284-88 and at 371.

Each product is a white, fluffy powder consisting of spherically-shaped particles. See Plaintiff's Exhibit 20, pp. 4-5. Each primary particle encompasses some 10,000 SiO_2 units. See Plaintiff's Exhibit 6, p. 24. Those particles form the aggregates and the agglomerates. See Tr. at 46.

The fumed silica has a basic structure of silicon and oxygen atoms in a tetrahedral arrangement where four oxygen atoms surround a central silicon atom. See id. at 160-61; Plaintiff's Exhibit 6, p. 17. As initially produced, at the surface of each silica particle are silicon and oxygen atoms with unfilled chemical bonds and valences capable of reaction in their ambient environment. See Tr. at 28, 252, 417. That reaction can be with water vapor engendered by the oxygen-hydrogen gas flame. See id. at 28, 269. When that is the reaction, the result is a product surface that contains inert siloxane groups (Si-O-Si) and active silanol groups (SiOH).[3] When that is the reaction, the result is hydrophilic.

The plaintiff produces the AEROSIL® at issue herein via reactions with the substances set forth in stipulated paragraph 14,

[3] See Tr. at 28, 251; Plaintiff's Exhibit 8, p. 2. Silanol is a "member of the family of compounds whose structure contains a silicon atom that is bound directly to one or more hydroxyl groups." McGraw Hill Dictionary of Scientific and Technical Terms, p. 1824 (5th ed. 1994). A hydroxyl group is an oxygen atom bonded to an atom of hydrogen. See id. at 972-73.

supra. See id. at 31; Plaintiff's Exhibit 18, second page. They block the formation of additional silanol groups on the silica surface which would otherwise result from exposure to the ambient environment. See Tr. at 27-28, 31, 240. Depending on the silane used, the residual silanol groups can range from 30 to 70 percent of the original number on an untreated surface. See id. at 30, 34, 85, 259; Plaintiff's Exhibit 6, p. 55. They are needed for the particular product's intended performance. See Tr. at 35. Whatever the precise treatment, however, does not affect the bulk of the silica, which retains its regular SiO_2 structure. See id. at 32, 269, 283. Cf. Plaintiff's Exhibit 6, p. 55, fig. 58.

In the end, the record shows and the court finds that the hydrophobic silica has lower moisture adsorption (or wettability) that allows it to be incorporated into certain organic solvents and polymers faster and easier than hydrophilic.

B

Given this evidence, the defendant points out, among other things, that

> the number of silo groups on the surface of the products in issue may vary from particle to particle, or even from batch to batch. Moreover, the products in issue do not contain permissible "impurities," in the form of the hydrocarbon moieties, within the meaning of Chapter 28, Note 1(a). The Explanatory Notes for Chapter 28, Chapter Note 1, provide guidance as to the meaning of "impurities" in Note 1(a). . . . Significantly, here, the[y]

> . . . state that substances (from the manufacturing process) are not in all cases to be regarded as "impurities" permitted under Note 1(a). "When such substances are deliberately left in the product with a view to rendering it particularly suitable for specific use rather than for general use, they are **not** regarded as permissible impurities. . . ."[4]
>
> [] Here, the carbon containing moieties in the products in issue are deliberately incorporated in, and left in, the products, with a view toward rendering them particularly suitable for specific use.[5]

The court concurs. But the above-quoted law, on its face, does not foreclose classification of plaintiff's products under HTSUS subheading 2811.22.50. They are fumed silicon dioxide with surface silanol groups, albeit intentionally reduced in number. That reduction has not left any of them within the purview of the three specific exclusions of the foregoing explanatory note, neither (a) natural silica nor (b) colloidal suspensions of silica nor (c) silica gel. There is no exclusion of the carbon-containing moieties added to their respective surfaces. Moreover, while it can be argued, as the defendant does, that the "products in issue are reaction products of silicon dioxide with other materials"[6], counsel have stipulated in the pretrial order, paragraph 17, that the

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[4] Supra note 1, p. 20, para. 5 (citation omitted, emphasis in original).

[5] Ibid., para. 6.

[6] Id. at 21, para. 7.

compounds in issue are not quasi-stoichiometric. Hence, they are not within the meaning of the precluded "deviations [that] have . . . been intentionally created" per general note 1 to HTSUS chapter 28, supra.

The defendant refers to explanatory notes regarding titanium oxides, number 28.23, and calcium carbonates, number 28.36. The first indicates that when titanium oxide is surface-treated it falls under HTSUS heading 3206, not within chapter 28. Note 28.36 advises that, when the particles of calcium carbonate powder are coated with a water-repellant film, classification should be under heading 3824, not 2836. Whatever the merit of these attempted analogies, there is no such note for silicon dioxide, the absence of which tends to support plaintiff's position.

II

Courts continuously remind parties to classification-of-chemicals cases such as this that determination of the nature of a good, in order to place it in the proper tariff category, is an issue of fact. E.g., Metchem, Inc. v. United States, 30 CIT ___, ___, Slip Op. 06-105, p. 2 (July 14, 2006), and cases cited therein. Here, the plaintiff has borne its burden of proving that the bulk and the essence of each of its powders at issue are

silicon dioxide, a separate chemically-defined compound. To find otherwise would clearly run contrary to the weight of the evidence on the record and convolute their correct classification:

> You would have to torture something in chemistry to try and make surfaces stoichiometric or to encompass them totally in the definition of a bulk. . . .

Tr. at 45. See also id. at 108, 190-91, 194, 201, 202, 220, 229-30, 237, 239, 240, 241, 253, 258, 262, 284-85, 322, 358, 411, 419, 420, 423-24, 426, 434-35, 437-38.

Judgment must therefore enter on behalf of the prevailing party plaintiff.

Decided: New York, New York
August 18, 2006

/s/ Thomas J. Aquilino, Jr.
Senior Judge