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VALENTINO SPA

RED CRYSTAL SUBSTITUTION CASE STUDY

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1. Commitment overview

Following up to its Detox Solution Commitment of February 6th 2013 and in line with the precautionary principle, VALENTINO SPA presents a research on Cadmium content in red crystals and possible alternatives in order to minimize the environmental impacts of manufacturing processes.

2. Introduction

Red bright color of many crystals is achieved using Cadmium and Cadmium compounds as coloring agents.

Cadmium and Cadmium compounds are toxic to aquatic life and are associated with a large number of health hazards (European Union Risk Assessment Report - CADMIUM OXIDE AND CADMIUM METAL RISK ASSESSMENT ECB 2007; ANNEX XV RESTRICTION REPORT CADMIUM AND ITS COMPOUNDS IN ARTISTS' PAINTS), therefore some of its uses are restricted under Annex XVII of REACH and many other regulations. With the aim to find no-Cadmium red crystals, a research on articles available on the market was made. A new bright red color has been identified and analytical tests demonstrating its suitability were performed.

3. Substituted substances

CADMIUM EC NUMBER: 231-152-8 CAS NUMBER: 7440-43-9

CADMIUM COMPOUNDS EC NUMBER: various CAS NUMBER: various

4. Application field

Handcrafted trims, decorative ornaments of wearing apparel and fashion accessories.

5. Case description

Crystal is a transparent faceted glass with a high degree of brilliance. Main raw materials including quartz, sand, and minerals are treated in different ratios to obtain the desired shade of the final artificial stone.

Manufacturing crystal in bright red, often needs the addition of Cadmium compounds in the original recipe, resulting in a great amount of total Cadmium content in final articles.

Within the EU, Cadmium has been classified as a substance of very high concern (SVHC): it is fatal if inhaled, it is very toxic to aquatic life with long lasting effects, it may cause cancer, it causes damage to organs through prolonged or repeated exposure and it is suspected of causing genetic

defects (<https://echa.europa.eu/it/substance-information/-/substanceinfo/100.028.320>). Because of its toxicity, Cadmium was restricted by EU and other legislations in several materials and applications as well as in plastic material, metal jewelry, paints or in electronic industry.

According to relevant data, toxicity of Cadmium and all Cadmium compounds is related to the release in the environment and exposure to the same toxic form, mainly Cd^{2+} ion (http://www.csst.qc.ca/en/prevention/reptox/Pages/information-sheet-whmis.aspx?langue=a&no_produit=4440; <https://echa.europa.eu/documents/10162/2f39ec55-4530-48f5-8ed9-31be889229cd>).

Aiming at using materials with low content of heavy metals, we researched for articles among crystal stones widespread on market.

Two Steps were therefore implemented:

Step 1

State of the art Identification of:

- Hight quality crystal stones;
- Shades very close to the desired red color;
- Materials Compliant to our requirements.

Red crystals of different suppliers were therefore evaluated on the basis of Lead and Cadmium content. Chemical test results, methods and investigated substances are shown in table 1:

Crystal Article	Supplier n°	Color name	Test Method	Pb (mg/Kg)	Cd (mg/Kg)	Test report
1	1	Siam	CPSC-CH- E1002-08	N.D.	2788 (FAIL)	17.35389
2	1	Light Siam			> PRSL VSPA (FAIL)	Supplier's declaration
3	2	Light Siam	CPSC-CH- E1002-08	N.D.	2525 (FAIL)	ITAT15011569
4	3	Light Siam	CPSC-CH- E1002-08	N.D.	1884 (FAIL)	18.3577
5	4	Siam			> PRSL VSPA (FAIL)	Supplier's declaration
6	4	Light Siam			> PRSL VSPA (FAIL)	Supplier's declaration
7	5	Siam			> PRSL VSPA (FAIL)	Supplier's declaration
8	5	Light Siam			> 100 (FAIL)	Supplier's declaration
9	1	Indian	CPSC-CH- E1002-08	N.D. (PASS)	N.D. (PASS)	17.60314

Table 1; N.D. = Not Detected; For testing details, please refer to Valentino PRSL.

Bright red colors like Siam and light Siam can have Cadmium content values higher than 2500 mg/Kg (test method based on CPSC-CH-E1002-08). Tests performed revealed that only Article 9 had not detectable Cadmium values.

Step 2

New Implementation

The presence of only one suitable article limits the use of red crystal palette, therefore Valentino asked to its suppliers to improve their technology production in order to get a new red color compliant with Valentino requirements.

The goal was reached with the “Scarlet” color developed by Swarovski (presentation video is also available <https://www.youtube.com/watch?v=5Yk3BNCK6NY>).

To verify the Lead and Cadmium content of the new crystal color, we carried out analytical tests (report N° 17.48787, available on request): results proved that Cadmium and Lead were “not detectable”(N.D.).

