

# The Cobalt Development Institute

**Public consultation on a possible restriction of hazardous substances (CMR 1A and 1B) in textile articles and clothing for consumer use under Article 68(2) of Regulation EC No 1907/2006 (REACH) – Table of responses from The Cobalt Development Institute.**

	Name of substance	CAS/EC number	Chemical group	Comments on presence/absence in textile and clothing articles and in non-textile (parts of) clothing articles and accessories (including imported articles). Questions 3.1, 3.3, 3.5, 3.7, 3.8	Comments on function of the substance. Questions 3.2, 3.5	Comments on concentration limit and enforceability. Question 3.9, 3.10	Comments on socio-economic elements. Questions 3.4, 3.6, 3.11	Is the information confidential (Yes/No)?
1	Cobalt acetate	71-48-7	NA	3.1 – It is unlikely that cobalt acetate will be found in any finished textile article as, although used as	3.2 Please refer to 'The CDI_response_to_the_EC_public_consultation_on_CMRS_in_textiles', submitted as a separate document in this public consultation.	3.9 – As there is no cobalt acetate found in finished textile products (either in the dyes or in the PET fibres), the limit of 50ppm can be met.	3.4 – Metal complex dyes have been decreasing in use. In some industries however they remain imperative. Metal-	No

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			<p>an intermediate in the synthesis of dyes and polyester, the compound is transformed during processing.</p> <p><b>1) In dyes, - cobalt salts are not present.</b></p> <p>Cobalt acetate is used as an intermediate in the synthesis of 2:1 metal complex dyes. During this process the cobalt disassociates from the acetate moiety and forms a compound with the dye molecules. Cobalt acetate is thus not found in the final dye.</p>	<p><b>A) cobalt based metal-complex dyes</b></p> <p>Three of the five proposed cobalt salts (cobalt sulphate, cobalt dichloride, and some cobalt acetate) are used as the starting material for the synthesis of dye compounds used in textiles. During the synthesis of these dyes the cobalt salt used is entirely converted into 2:1 metal complex dye whereby two dye molecules are attached to a single metal atom.</p> <p>During the manufacturing process, the cobalt (II) salt becomes oxidised to cobalt (III), forming a complex with the dye compounds. There is thus no presence of any of the three above-mentioned cobalt salts in the final dye. In addition, the cobalt is strongly bound in the metal complex dye and therefore cannot easily disassociate and be released.</p> <p>Although there is no presence of any initial cobalt salts in the final dye, the cobalt metal ion may be found as an impurity in the dye. The production process of cobalt-based metal complex dyes is optimized to minimise the</p>	<p>Existing Oeko-Tex standards are successfully followed by industry whereby limits of extractable cobalt are 1ppm for baby clothes and 4 ppm for adult clothing.</p> <p>Any residual impurities of cobalt in textile dyes are already controlled by existing standards</p> <p>3.10 – The analysis of free metals in textiles is performed according to standardised methods: DIN EN ISO 105-E04 for the elution, ISO 17294-2 (using ICP/MS) for the detection. To obtain the eluate according to DIN EN ISO 105-E04, textiles are treated with a sweat</p>	<p>complex dyes such as those that use cobalt have a high light-fastness which cannot be achieved by using alternative dyes. In the automobile industry for example light-fastness is an important quality to avoid the colour fading and so metal complex dyes are preferred and are still used.</p> <p>In the past 25 years, the production of dyes in the United States, Western Europe and Japan has decreased significantly, while production in Asian countries,</p>	
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			<p><b>2) Cobalt acetate is not present in polyester.</b></p> <p>a) It is used as a catalyst in the manufacture of purified terephthalic acid (PTA) and Dimethyl Terephthalate (DMT), both precursors of polyethylene terephthalate (PET) or polyester resin.</p> <p>During the synthesis of PTA using cobalt diacetate as a catalyst, cobalt is transformed into a complexed form (cobalt terephthalate) at a part per billion</p>	<p>presence of non-complexed cobalt in the final product. A first approximation of the extractable cobalt content in textile dyed with complex dyes can be done using as a reference the cobalt limit of 500 ppm recommended by ETAD and recently adopted by ZDHC<sup>1</sup>. When dyeing a textile, the concentrations of dye used are between 0.1 and 3%. By taking a worst case scenario where there is a presence of non-complexed cobalt in the dye at the maximum limit of 500ppm and the article of clothing uses a dye of 4% concentration, the maximum amount of extractable cobalt present in the final textile would be estimated as 500 ppm x 0.04 = 20ppm extractable cobalt in the textile.</p> <p>In practice, the final concentration of cobalt is likely to be far less than 20ppm. In the many existing textile standards the level of allowed cobalt as extractable impurity in the textiles is much lower than 20 ppm, and complex dyes are manufactured in a purity which will comply with such requirements. As</p>	<p>simulant to mimic the effect of perspiration.</p>	<p>has increased<sup>2</sup>. Inside the EU, Italy represents the largest producer of dyes. The use of metal complex dyes has sharply reduced in the textile industry and many existing schemes prevent their continued use. There are currently only some 25 cobalt complex dyes on the market (compared to hundreds of organic dyes), of which only one had a high enough tonnage (&gt; 100 tpa) for the REACH 2013 registration deadline. Depending on the</p>	
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<sup>1</sup> ZDHC = Zero Discharge Hazardous Chemical Group

<sup>2</sup> IHS (2014), Chemical Economic Handbook – Dyes.

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			<p>(ppb) level.          b) Cobalt acetate can also be added as a colourant to modify PET resin. (Note: this practice is only used outside of the EU and the EU industry has voluntarily phased this process out since 2014). However, again, the cobalt acetate is transformed during processing.</p> <p>3.3 –Cobalt acetate is unlikely to be found in final textile products so there will be no risk of dermal or</p>	<p>an example, the Global Organic Textiles Standard (GOTS) state:  <i>“They [GOTS] have not heard about any problems from certifiers or certified entities about any cobalt contamination in dyes above the ETAD level of 500ppm which we take as ‘heavy metal free level’ or above 1ppm in eluate testing of textile products”</i> <sup>3</sup>.</p> <p>Within the textiles industry there is a wide variety of different standards used by different textile manufacturers however 95% of the manufacturers refer to the voluntary standard OEKO-TEX, an independent testing and certification system for textile raw materials, intermediates and end products at all stages of production. The OEKO-TEX standard imposes a limit of ‘extractable heavy metals’ of 1 mg cobalt/kg in textiles used in baby clothing and 4 mg cobalt/kg in textiles used in adult clothing (OEKO-TEX <sup>4</sup>). Such standards are met without difficulty, resulting in the exposure to the consumer being considered</p>		<p>burden of cost and workload on EU industry for the manufacture of the remaining dyes, the upcoming 2018 REACH deadline will show whether the manufacture of these dyes is continuing at all in the EU.          3.6 – No          3.11 - No</p> <p>Imported PET resin or PET fibre, which represents 20-25% (around 3.3 million tonnes per annum) of the PET resin in the EU, may be intentionally coloured with cobalt acetate and can contain an average of around</p>	
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<sup>3</sup> Global Organic Textile Standard (GOTS), Version 4.0, pg 35. [http://www.global-standard.org/images/GOTS\\_Version4-01March2014.pdf](http://www.global-standard.org/images/GOTS_Version4-01March2014.pdf)

<sup>4</sup> [https://www.oekotex.com/en/manufacturers/test\\_criteria/limit\\_values/limit\\_values.html](https://www.oekotex.com/en/manufacturers/test_criteria/limit_values/limit_values.html)

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			<p>inhalation exposure to current and future consumers.</p> <p>3.5 – No</p> <p>3.7 – <b>As a colourant of PET resin</b></p> <p>In Europe the cobalt acetate is recycled during the PTA manufacturing process and non-cobalt containing dyes are used instead to correct the colour of the PET resin.</p> <p>3.8 – PET resin can be used to make plastics and therefore cobalt acetate may be used as an intermediate in</p>	<p>negligible.</p> <p><b>B) In the manufacturing of polyester fibre precursors</b></p> <p>Cobalt acetate is used as a catalyst in the manufacture of purified terephthalic acid (PTA) and Dimethyl Terephthalate (DMT), both compounds are precursors of polyethylene terephthalate (PET) or polyester resin.</p> <p>During the synthesis of PTA using cobalt diacetate as a catalyst, the cobalt is transformed into a complexed form (cobalt terephthalate) which is present at a part per billion (ppb) level. There is no release of cobalt from the complex form.</p> <p>PTA is then manufactured into the PET resin which is used to form the PET fibres used for textile articles. The levels of free PTA in PET (the final product that is present in textiles) are so low that they are below the limit of detection for PTA (35ppb). It is therefore very unlikely that free cobalt will be found in polyester textiles.</p>		<p>40ppm complexed cobalt metal. The amount (%) of cobalt extractable from the PET fibre is not known. Therefore it may be appropriate to regulate the imported PET resin or fibres, for example through a restriction. This step would create a level playing field between the EU manufacturers and importers of PET resin.</p>	
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				plasticised materials. In the final product however no cobalt acetate will be found.	3.5 - No			
2	Cobalt carbonate	513-79-1	NA	3.1 - No use has been found for cobalt carbonate in the textile industry 3.3 – Not being used in any point of textile manufacture provides evidence that cobalt carbonate will not cause dermal or inhalation exposure of consumers. 3.5 - No 3.7 – No 3.8 – No	3.2- No use has been found for cobalt carbonate in the textile industry  3.5 - No	3.9 – No evidence has been found of cobalt carbonate use in the textile industry.  3.10 – The analysis of free metals in textiles is performed according to standardised methods: DIN EN ISO 105-E04 for the elution, ISO 17294-2 (using ICP/MS) for the detection. (see point 3.10 above for cobalt acetate).	3.4 – No 3.6 – No 3.11 - No	No

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3	Cobalt dichloride	7646-79-9	NA	<p>3.1- In dyes, cobalt dichloride is used as an intermediate in the synthesis of 2:1 metal complex dyes. During this process the cobalt disassociates from the chloride moiety and forms a compound with two dye molecules. Cobalt dichloride is thus not found in the final dye and will not be found in textile articles.</p> <p>3.3 – The fact that cobalt dichloride is unlikely to be found in the final textile product is evidence of no</p>	<p>3.2 – See cobalt acetate 3.2 A) “cobalt based metal-complex dyes”.</p> <p>3.5- No</p>	<p>3.9 – As there is no cobalt dichloride found in finished textile products, the limit of 50ppm can be successfully met.</p> <p>Existing Oeko-Tex standards are successfully followed by industry whereby limits of extractable cobalt are 1ppm for baby clothes and 4 ppm for adult clothing.</p> <p>3.10 – The analysis of free metals in textiles is performed according to standardised methods (DIN EN ISO 105-E04 for the elution, and ISO 17294-2 (using ICP/MS) for the detection. (see comment above for cobalt acetate)</p>	<p>3.4 – see cobalt acetate section.</p> <p>3.6 – No</p> <p>3.11 - No</p>	No
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				dermal or inhalation exposure to current and future consumers. 3.5 - No 3.7 – No 3.8 – No				
4	Cobalt Nitrate	10141-05-6	NA	3.1 - No use has been found for cobalt nitrate in the textile industry. 3.3 – Not being used in any point of textile manufacture provides evidence that cobalt carbonate will not cause dermal or inhalation exposure of consumers. 3.5 – No 3.7 – No 3.8 – No	3.2 - No use has been found for cobalt nitrate in the textile industry. 3.5 - No	3.9 We have not found any evidence of cobalt nitrate being used in the textile industry.  3.10 – The analysis of free metals in textiles is performed according to standardised methods: DIN EN ISO 105-E04 for the elution, ISO 17294-2 (using ICP/MS) for the detection. (see Co acetate above).	3.4 - No 3.6 – No 3.11 - No	No

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5	Cobalt Sulfate	10124-43-3	NA	<p>3.1 - In dyes, cobalt sulfate is used as an intermediate in the synthesis of 2:1 metal complex dyes. During this process the cobalt disassociates from the acetate moiety and forms a compound with the dye molecules. Cobalt sulfate is thus not found in the final dye and will not be found in textile articles.</p> <p>3.3 – The fact that cobalt sulfate is unlikely to be found in the final textile product is evidence of no</p>	<p>3.2 - See cobalt acetate 3.2 A) “cobalt based metal-complex dyes”.</p> <p>3.5 - No</p>	<p>3.9 – As there is no cobalt sulfate found in finished textile products the limit of 50ppm can be successfully met.</p> <p>Existing Oeko-Tex standards are successfully followed by industry whereby limits of extractable cobalt are 1ppm for baby clothes and 4 ppm for adult clothing.</p> <p>3.10 – The analysis of free metals in textiles is performed according to standardised methods: DIN EN ISO 105-E04 for the elution, ISO 17294-2 (using ICP/MS) for the detection. (see Co acetate above).</p>	<p>3.4 – See cobalt acetate section.</p> <p>3.6 – No</p> <p>3.11 - No</p>	No
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# *The Cobalt Development Institute*

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