Chrome yellow paint fabrication

PhD project 2018-2022
Gauthier Patin, Art Ness Proaño Gaibor

Pigments	_ Sigma Aldrich, Lead (II) chromate _ Lemon chrome yellow L2b : $PbCr_{1-x}S_xO_4$ with x = 0.5 (made in Lisbon with V. Otero)[1]
Date	From 30/04/2019 to 02/05/2019
Location	Rijksdienst voor het Cultureel Erfgoed, Atelier Gebouw, Amsterdam, The Netherlands
Participants	Gauthier Patin[2] under the supervision and with the help of Art Ness Proaño Gaibor[3]
Purpose	The paint will be used in three different projects: 1. The majority of the paint will be used by the artist Charlotte Caspers in order to paint a reconstruction of the Sunflowers painting by Van Gogh. This reconstruction has been ordered by the Van Gogh Museum in the frame of the 2019 summer exhibition on the sunflowers. 2. A small part of the paint will be given to Gauthier Patin for his PhD experiments on colour changes in Van Gogh artworks. 3. Another small amount will be given to Laurens van Giersbergen for his Master thesis experiments on the comparison of different light aging devices.
Results	Two aluminum tubes containing chrome yellow paint have been made: 1. Sigma Aldrich, Lead (II) chromate : 98.2176 g 2. Lemon chrome yellow L2b : 53.92914 g More information about each chrome yellow paint is given below (Tables 1 and 2).
Safety	Since chromium (VI) oxide is extremely toxic, each step of the recipe has been performed under a fume-hood/masks with blouse, gloves, and glasses. We recommend to read the International Chemical Safety Card on chromium (VI) oxide before making such pigment.
Ingredients & tools	• Windmill pressed linseed oil → same oil used for the ReViGo project (Geldof et al., 2018) • Glass plates • Glass mullers • Aluminum empty tubes • Knifes and spatula

1 A previous report describes the fabrication of this pigment
2 University of Amsterdam and Van Gogh Museum, Amsterdam, The Netherlands
3 Rijksdienst voor het Cultureel Erfgoed, Amsterdam, The Netherlands

Working steps

1°. The wetting

This first step, under the fume-hood, consists of adding a few drops of oil to the pigment with a spatula (Illustration 1). The pigment becomes less powdery and we can now work outside the fume-hood but with a mask (Illustration 2).

2°. The Mixing or the grinding

In this second step, the final consistency of the paint is achieved by adding oil and grinding the pigment with a glass muller over a glass plate (Illustration 3). This process has to be repeated several time before obtaining the desired quality of the paint.

3°. Filling the tube

Once the paint is ready, it can be inserted in empty aluminium tube using a spatula. Illustration 4 shows the final aspect of the paint when applied on a black & white Leneta® chart with a 100µm draw-down bar.

Illustration 1: Wetting phase

Illustration 2: Aspect of the pigment after the wetting phase

Illustration 3: Grinding and mixing phase

Illustration 4: Chrome yellow lemon paint-out

Quantity of ingredients used for each paint

Sigma Aldrich, Lead (II) chromate			
Oil $_i$	70.44262 g	Δ = 15.29896 g	Δ_{Total} = 102.66346 g
Oil $_f$	55.14366 g		
Pigment $_i$	122.6040 g	Δ = 87.3645 g	
Pigment $_f$	35.2395 g		
Empty tube	4.92126 g	**Δ_{Final} = 98.2176 g**	
Filled tube	103.1391 g		

Table 1. *Quantity of oil and pigment used for the lead (II) chromate paint*

Chrome Yellow Lemon, L2b					
Oil $_i$		66.1092 g	Δ = 14.22483 g		Δ_{Total} = 62.70278 g
Oil $_f$		51.88609 g			
Batch 1 (09-04-2019)	**Pigment1 $_i$**	30.36019 g	Δ_1 = 4.27159 g	Δ_{Total} = 48.47795 g	
	Pigment1 $_f$	26.08860 g			
Batch 2 (11-04-2019)	**Pigment2 $_i$**	46.55544 g	Δ_2 = 20.76125 g		
	Pigment2 $_f$	25.79419 g			
Batch 3 (12-04-2019)	**Pigment3 $_i$**	44.60707 g	Δ_3 = 18.49939 g		
	Pigment3 $_f$	26.10768 g			
Batch 4 (16-05-2014)[4]	**Pigment4 $_i$**	12.68652 g	Δ_4 = 4.94572 g		
	Pigment4 $_f$	7.74080 g			
Empty tube		4.92126 g	**Δ_{Final} = 53.92914 g**		
Filled tube		58.85040 g			

Table 2. *Quantity of oil and pigment used for the chrome yellow lemon paint*

The four batches have been mixed in order to obtain a single, consistent paint. The colour of batch 4 was however slightly darker and warmer than the other batches.

4 This pigment was made and sent by Vanessa Otero in 2014 and a part of it was used in the ReViGo project.