

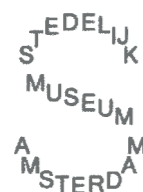


Cultural Heritage Agency
Ministry of Education, Culture and Science

28 AND 29 MARCH 2013

Issues in Contemporary Oil Paint

Book of Abstracts



The Getty Conservation Institute



Cultural Heritage Agency
Ministry of Education, Culture and Science

Issues in Contemporary Oil Paint

ICOP



Cultural Heritage Agency
Ministry of Education, Culture and Science

Symposium
28/29 March 2013
Amersfoort
The Netherlands

Symposium *Issues in Contemporary Oil Paint* (ICOP)

Amersfoort, 28/29 March 2013

Book of Abstracts

Editors:

Klaas Jan van den Berg
Matthijs de Keijzer, Tom Learner, Gunnar Heydenreich, Jay Krueger, Aviva Burnstock
and Alberto de Tagle

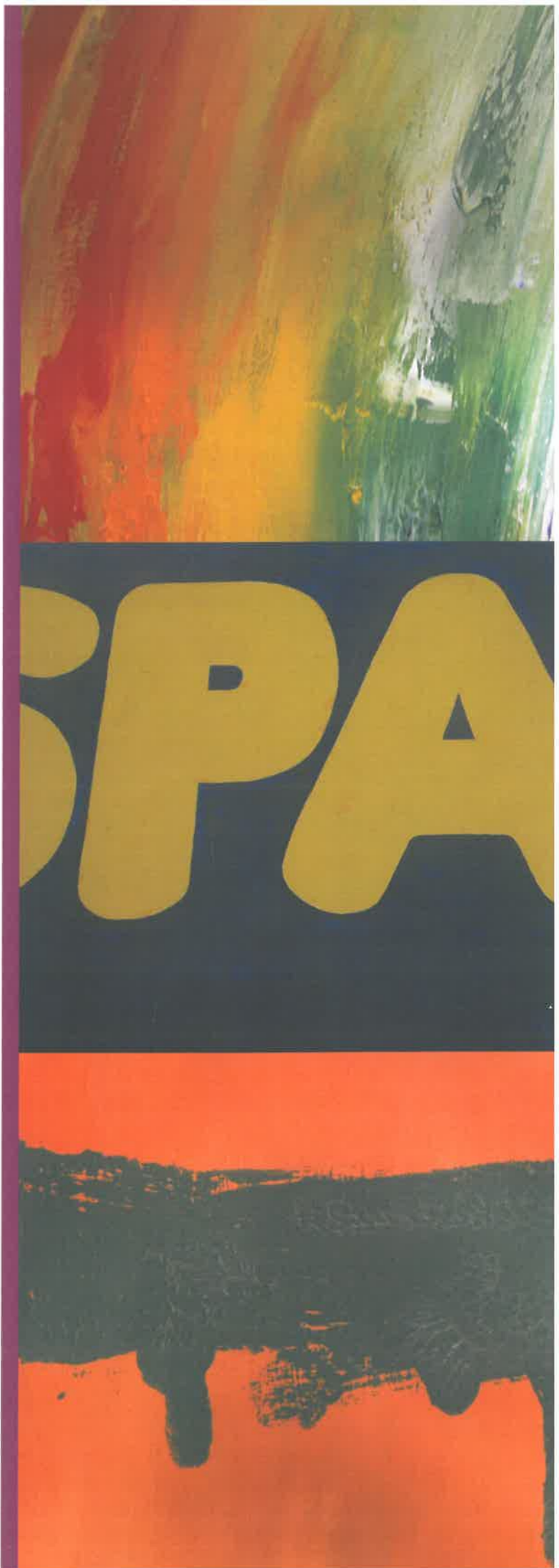
Design: Agnes Brokerhof, Bart Ankersmit, Klaas Jan van den Berg

Printing: Print X-press, Amersfoort

Photo credits (outside abstracts, for which authors are responsible):

Klaas Jan van den Berg, except for Laura Mills (cover); Louise Wijnberg (p.3a, 31b),
Aviva Burnstock (p.3b), Muriel Geldof (p.13a,c) Emilie Froment (p.113a,e), Henk van
Keulen (p.113b) Tiarna Doherty (p.129c)

Table of Contents



| | | |
|---|---|-----------|
| Program | | 11 |
| Cees van 't Veen | Opening and Welcome | 15 |
| Klaas Jan van den Berg | Introduction to the Symposium – The 20 th Century Oil Paint Project | 17 |
| Session theme 1: Conservation problems, collection and changes | | 21 |
| Jay Krueger | Conservation and the Surface of Contemporary Oil Paint | 23 |
| Louise Wijnberg | Do we see what we know or do we know what we see? Conservation of Oil Paintings in the Stedelijk Museum | 24 |
| Lydia Beerkens | Towards the right Look; on the Conservation of 3D painted Artworks | 27 |
| Session theme 2: Paint Technology | | 31 |
| Robert Gamblin | Intro: A Manufacturer's Perspective on the Making of Color for Today's Oil Painters | 33 |
| Ian Garrett | A history of colour making at Winsor & Newton in the 20th century | 36 |
| Matthijs de Keijzer | The Delight of Modern Pigment Creations | 39 |
| Pieter Keune | The Long and Winding Road to Acceptance of Water- based Oil Paints | 42 |
| Francesca Izzo | Modern Oil Paints – Formulations, organic additives and degradation: some case studies | 44 |
| Poster Session abstracts | | 47 |
| Dawn Rogala | In Defense of Technical Studies | 49 |
| Dawn Rogala | Hans Hofmann's Last Lesson: A Study of the Artist's Materials in the Last Decade of His Career | 51 |
| Mary Bustin | Towards interpretation of making, meaning and change in British Twentieth Century oil paintings: the relevance of an artist's paint archive | 52 |
| Albrecht Pohlmann | „Weimarfarbe“: From Oil to Tempera. The Transformable Oil Paint and the Masters of the Weimar Bauhaus | 54 |
| Maria Kokkori et al. | Charting the development of oil-based enamel paints through the correlation of historical paint technology manuals with scientific analysis | 55 |
| Steven Saverwyns and Elisabetta Malara | Zinc soap formation on the surface of a 20th century monumental painting (?) | 57 |
| Letizia Monico et al. | The degradation process of chrome yellows: a focus on the reactivity between different forms of chrome yellows and the oil binder | 58 |
| Stefan Zumbühl and Nadim Scherrer | Derivatisation technique for enhanced FTIR-FPA imaging: localisation of oxidative ageing products in modern oil paint | 59 |

| | | |
|--|---|----|
| Shuya Wei et al. | Characterization of alkyd resin used in art works: the influence of ageing | 60 |
| Catherine Defeyt et al. | Identification of the Phthalo blue polymorphs in artists' paints by XRD, μ -FTIR and μ -Raman | 61 |
| Pedro Caetano Alves | Different Methods of Oil analysis in Oil Paints | 63 |
| Alexia Soldano | Investigation of the practical use of conductivity measurements on water-sensitive modern oil paintings | 64 |
| Beatriz V3rissimo Mendes | New Approaches to Surface Cleaning of Contemporary Unvarnished Oil Paintings - Moist Sponges and Cloths | 66 |
| Bronwyn Ormsby et al. | New cleaning systems: a solution for <i>Piano</i> , Richard Smith's sensitive oil-based 3-D painting | 68 |
| Laura Fuster-Lopez et al. | The Role of Grounds in Contemporary Oil Paintings: An Approach to Their Stability and Preservation | 70 |
| Mirta Pavic and Tesa Horvaticcek | Issues in Contemporary Oil Paint | 72 |
| Cynthia Albertson and Ana Martins | Piet Mondrian in the Collection of the Museum of Modern Art - Condition Issues | 74 |
| Michael Duffy et al. | Rene Magritte's <i>The Menaced Assassin</i> , 1927-a case study | 75 |
| Ida Antonia Tank Bronken and Jaap Boon | On the formation of drips and softening paint in paintings by Jean-Paul Riopelle | 77 |
| Kate Helwig et al. | Using analysis to shed light on conservation issues in modern oil paintings by Canadian artists | 79 |
| H3l3ne de S3gogne | Georges Mathieu(1921-2012). <i>Th3or3me de G3del</i> , Study of a "tubism" painting and its alterations. Research of a refixing method with a solvent | 81 |
| Hannie Diependaal et al. | Tempera prepared by Otto Mueller circa 1917. Paint analysis and implications for conservation | 83 |
| Maria Perla Colombini et al. | Chemical investigations of paint media in Edvard Munch's monumental sketches (1909-1916) | 85 |
| Susanne Stangier | A delicate surface. Nicolas de Sta3l, <i>Fleur grises</i> , 1953 | 86 |
| Francesca Modugno et al. | Synthetic pigments and binders of <i>Ri de Pomme</i> by Julian Schnabel at the Pecci Museum, Prato | 88 |
| Matteo Piccolo, Francesca Izzo et al. | The conservation project of a big canvas painting cycle: Giulio Aristide Sartorio and <i>The poem of Human Life</i> (1907) at Ca' Pesaro, Venice | 89 |

| | | |
|---|--|------------|
| Session theme 3: Paint degradation and long term stability | | 91 |
| Aviva Burnstock | Challenges in research: Connecting material studies with conservation problems and solutions | 93 |
| Anna Cooper | Water Sensitive Oil Paints in the 20th Century | 95 |
| Alysia Sawicka | Metal Soap Efflorescence in Contemporary Oil Paintings | 99 |
| Jaap Boon | Towards an Understanding of Dripping Oil Paint in Paintings | 103 |
| Gillian Osmond | Zinc white and the influence of paint composition for stability in oil based media | 105 |
| Katrien Keune and Gwendolyn Boev3-Jones | Its surreal: zinc-oxide degradation and misperceptions in Salvador Dali's <i>Couple with Clouds in their Heads</i> | 109 |
| Session theme 4: Surface conservation options | | 113 |
| Chris Stavroudis and Richard Wolbers | Approaches to cleaning soluble paint surfaces that shouldn't be | 115 |
| Maude Daudin and Henk van Keulen | Dry Cleaning: research and practice | 118 |
| Annegret Volk | Agar - a new aide for the surface cleaning of water sensitive oil paint | 121 |
| Jenny Schulz | Set back the race: Treatment strategies for running oil paint | 124 |
| Diana Blumenroth | Modern oil paints: solubility of synthetic organic-pigments in solvents | 126 |
| Delegates | | 131 |
| Acknowledgements; project members and partners; organisation | | 136 |

Sensitivity of modern oil paints to solvents: effects on synthetic organic pigments

Diana Blumenroth,^a Stefan Zumbühl,^b Nadim C. Scherrer^b and Wolfgang Müller^c

^a Cologne Institute of Conservation Sciences, University of Applied Sciences, Germany

^b Bern University of Arts, Bern University of Applied Sciences, Switzerland

^c H.Schmincke & Co. GmbH & Co. KG, Erkrath, Germany

Introduction

Modern oil paints show a new complexity of performance and sensitivity in comparison to "classic" oil paints. An important part of this new characteristic is the wide use of synthetic organic pigments. These can be present in works of art since the early 20th century and are now the most important group of pigments in the bright hues of modern artist's paints. Some synthetic organic pigments found in "classic modernism" paintings of the early 20th century, proved to be well soluble. As a consequence, the specific particle properties as well as the sensitivity to solvents pose a particular challenge in conservation treatments of modern oil paint.¹ The solvent sensitivity of these pigments is not evident in their chemical structure as the properties are altered by selective modifications of the structure and encapsulation. It is thus likely that early pigments may behave different to contemporary ones. Properties of dissolution are thus influenced by the chemical nature, crystal structure, particle size, as well as surface modifications of the pigment products.

Analysis/Experiments

The sensitivity to solvents of artist's paints containing organic pigments arises not only from the solubility of the pigment itself, but also from the characteristics of the surrounding binder matrix and the swelling behaviour of the system as a whole. The solvent resistance of 23 organic pigments in oil paint was tested with 6 solvents (n-hexane, toluene, chloroform, diethyl ether, acetone and ethanol). The solubility of the pigments was determined quantitatively by immersion of the pure pigments in solvents, and by immersion of artificial aged oil paint films. The time-resolved extraction was determined by UV-VIS spectroscopy. Following solvent treatment by immersion of paint films, the influence of pigment extraction along the surface was examined applying infrared spectroscopy FTIR-ATR. Raman spectroscopy was used to study morphological effects of extraction on polished crosssections of embedded oil paint films. Structural damage was examined under practical conditions with clean cotton swabs using the 6 solvents.

Results and discussion

Almost all pigments produced suspensions due to the very small particle size and low density. After filtration with a 0.2 μ m syringe filter, the soluble pigments became apparent. These were the yellow and orange azo pigments PY3, PY97, PY153, PO5, the orange pyrazolochinazolone PO67, the red anthraquinone PR83:1, phthalocyanine blue PB15:6, and the dioxazine PV23, and to a lesser extent the red azo pigments PR188, PR177, as well as the anthraquinone perylene PR179. The solubility is similar to the sensitivities known from the literature and industry. The time-resolved quantitative

¹ D. Blumenroth, Die Lösemittlempfindlichkeit synthetisch-organischer Pigmente in Ölfarben, MA-Thesis, Bern university of applied sciences, conservation and restoration HKB, Bern (2010).

extractions were determined on the 8 pigments above in artificial aged oil paint films. The azo PY3, PY97 and PO5 exhibited particularly high extractability. This is, of course, partly due to the solubility of the pigments, but it is also influenced by the swelling behaviour of the surrounding binder matrix. Accordingly, based on the strong dispersive force interaction, chloroform often showed the highest extraction capacity. Good solubility usually is encountered along the polarity scale from the polarisable toluene up to the dipolar acetone. Towards the non-polar end of the polarity scale, the solubility decreases in general. The non-polar n-hexane is a poor solvent with synthetic organic pigments. The blue phthalocyanine PB15:6 also exhibits high solvent sensitivity, with the highest extraction rate observed in toluene.

The structural changes within the paint film were investigated using an artificial aged oil paint film containing the yellow azo pigment PY3 and exposed to chloroform. Applying infrared spectroscopy FTIR-ATR to the surface of the leached films, the surface pigment response was tested following solvent exposure of 1, 2, 5, 10 and 15 minutes. After an immersion time of 1 minute almost no pigment could be detected on the surface. With

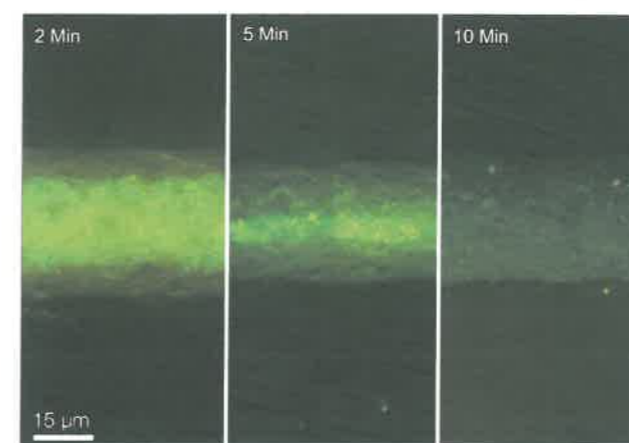


Fig. 1: Cross sections of samples immersed in chloroform. Pigment loss is visible: after 10 minutes no pigment is left in the paint film.

Raman spectroscopy, the pigment concentration was examined along profiles across the embedded paint films on polished cross-sections. The pigment gradually leached from the exposed surfaces. Immediate leaching of the pigment occurs within the swollen parts of the film (Figure 1). This suggests tremendously fast solubilisation of the pigment, as the solubility of the pigment is greater than the rate of diffusion of the solvent in the paint film. Upon drying of the paint film, a porous film is left due to pigment elimination.

To test the sensitivity to solvents of paint layers containing synthetic organic pigments under realistic conditions, cotton swab wipe tests with minimal pressure application were performed. This allows the solvent to act in combination with minor mechanical action on the surface. The wipe samples showed that all verified pigments reacted very sensitively, some exhibited pigment extraction already on first contact with the cotton. This was independent whether the pigments were soluble or insoluble in the above examinations. In general, abrasion/extraction was lowest on cotton swabs soaked with non-polar solvents [Figure 2]. Solvents producing strong swelling of the oil binder caused an enhancement of this effect. However, in contrast to the general solubility, polar solvents were very harmful. This may be explained by photochemical degradation and the change of the

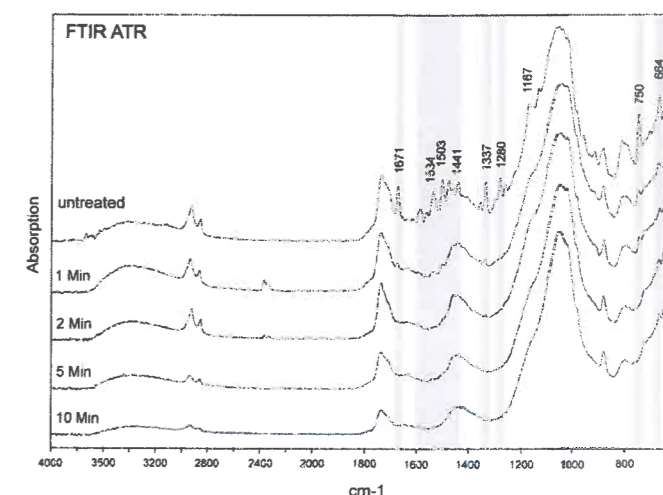


Fig. 2: FTIR-ATR spectra show almost complete leaching of the pigment from the surface after 1 minute immersion. After 2 minutes no more pigment can be detected.

polarity of the binder in the paint layer's surface. It also shows that the low wipe resistance is likely due to the small particle dimension of the pigments.

The overall results demonstrate the delicate behaviour of such oil paint layers containing synthetic organic pigments when they come into contact with solvents (Figure 3). This should be regarded as a serious problem of practical conservation and restoration treatments applied to modern paints with a considerable potential to harmful consequences.

| Pigment | | Sensitivity | | Paint samples | | | | | | Cleaning samples | | | | | |
|---------|-----------------------|-------------|--------------|--------------------|---------------|---------|------------|---------|---------|---------------------|---------------|---------|------------|---------|---------|
| C.I. | Pigment class | Literature | Pigment pure | Pigment solubility | | | | | | Solvent sensitivity | | | | | |
| | | | | Hexane | Diethyl ether | Toluene | Chloroform | Acetone | Ethanol | Hexane | Diethyl ether | Toluene | Chloroform | Acetone | Ethanol |
| PY3 | Monoazo | *** | *** | o | * | ** | *** | *** | * | * | ** | ** | *** | *** | *** |
| PY97 | Monoazo | | *** | o | o | * | *** | ** | o | * | ** | ** | *** | *** | *** |
| PO5 | b-Naphthol | *** | *** | o | * | * | ** | * | o | * | * | * | *** | *** | ** |
| PR188 | Naphthol AS | | * | o | o | o | o | o | o | * | ** | *** | *** | *** | *** |
| PY151 | Benzimidazolone | o | o | o | o | o | o | o | o | o | * | * | * | *** | *** |
| PY155 | Bisacetoacetarylide | o | o | o | o | o | o | o | o | o | * | ** | *** | *** | *** |
| PR242 | Disazo condensation | * | o | o | o | o | o | o | o | * | ** | ** | *** | *** | *** |
| PY153 | Metal complex | * | * | * | * | * | * | * | o | o | * | * | *** | *** | ** |
| PY139 | Isoindolinone | o | o | o | o | o | o | o | o | o | * | * | *** | *** | *** |
| PB15:6 | Phthalocyanine | *** | *** | * | * | *** | ** | ** | * | o | * | * | ** | ** | ** |
| PG7 | Phthalocyanine | o | o | o | o | o | o | o | o | o | * | * | ** | ** | * |
| PG36 | Phthalocyanine | o | o | o | o | o | o | o | o | o | o | ** | *** | *** | ** |
| PV19 | Quinacridone | o | o | o | o | o | o | o | o | o | ** | ** | *** | *** | *** |
| PR122 | Quinacridone | o | o | o | o | o | o | o | o | * | ** | ** | *** | *** | *** |
| PR209 | Quinacridone | o | o | o | o | o | o | o | o | * | ** | *** | *** | *** | *** |
| PR179 | Perylene | o | * | o | o | o | o | o | o | * | ** | ** | *** | *** | *** |
| PO43 | Perinone | o | o | o | o | o | o | o | o | * | ** | *** | *** | *** | *** |
| PR177 | Antraquinone | o | * | o | o | o | o | o | o | o | ** | *** | *** | *** | *** |
| PR83:1 | Antraquinone CA | *** | ** | * | * | * | * | * | * | o | * | * | ** | *** | ** |
| PB60 | Indanthrene | o | o | o | o | o | o | o | o | * | ** | ** | *** | *** | *** |
| PV23 | Dioxazine | * | * | o | * | * | * | * | o | o | * | * | *** | *** | ** |
| PR264 | Diketopyrrolo-pyrrole | | o | o | o | o | o | o | o | o | * | *** | *** | *** | *** |
| PO67 | Pyrazoloquinazolone | *** | *** | o | o | * | *** | * | o | o | * | ** | *** | ** | * |
| PW4 | Zinc white | | o | o | o | o | o | o | o | o | o | * | * | * | * |

Solvent sensitivity: o insoluble, * low, ** high, *** very high

Fig. 3: Summary

Delegates

Acknowledgements;
Project members
Partners

