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Investigating Vynol: Australia's first artists' acrylic and vinyl-acrylic emulsion paints

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ABSTRACT

Vynol Paints, established in 1964, was the first manufacturer of artists' acrylic paints in Australia. However, it has received minimal recognition in the art historical, conservation and technical art research fields. It is the aim of this paper to address this research gap by considering its relevance to material knowledge and conservation practice, as part of a broader investigation into the relationship between acrylic paints and the Australian colourfield painting movement. Vynol was found to be used by artists featured in the seminal exhibition, *The Field* (1968), at the National Gallery of Victoria. This interdisciplinary study presents archive material, interview findings and Fourier transform infrared (FTIR) spectroscopy analysis of Vynol paints, showing connections between the movement's artists and the manufacturer. It reveals that, during the 1960s, Vynol produced vinyl-acrylic paints – copolymers of polyvinyl acetate (PVAc) and an acrylate monomer, a formulation that was likely used by some of the artists associated with *The Field* exhibition. Hence, identification of the PVAc/acrylic copolymers using FTIR spectroscopy is explored.

HISTORICAL BACKGROUND

Vynol Paints, as a paint manufacturer, was highly receptive to the local market for acrylic emulsion paints. Within ten years (1964–75), the company distributed its products across Australia and also exported to New Zealand (Goodwin 1971, 440). Vynol's connections with local artists during this period, particularly with those associated with *The Field* exhibition (1968), are of significance. As the first comprehensive Australian exhibition of colourfield painting and abstract sculpture, *The Field* gave visibility to local artists whose work reflected the influence of American formal abstraction and of the Greenbergian theory. Documentary evidence from this research suggests that these artists not only used these early acrylic paints, but also had some influence over the development of Vynol products.

The company's history

In 1964, Jim Cobb and Les Patterson founded Vynol Paints. It operated from modest production facilities in Kings Cross, Sydney, within a building that was originally used to stable horses. Manufacturing student grade acrylic paints was the primary aim of the company. It quickly became the major school and retail supplier of acrylic paints across Australia during the late 1960s and early 1970s. When interviewed on 4 November 2016, Cobb explains that the impetus to make acrylic paints was due to the 1962 Wyndham Scheme, which introduced art as a compulsory high school subject. Cobb was an artist and also a high school teacher. He sourced raw materials from household paint manufacturers in order to formulate a student grade acrylic paint, as an ideal non-toxic paint option for students. In 1975, the Vynol founding members parted ways. Cobb went on to establish the company Chromacryl (now Chroma Australia) and Patterson kept Vynol Paints, which went on to be called Derivan, manufacturing Matisse Derivan acrylic paints.

Vynol Paints products

Vynol primarily catered for the art education market. However, the company did produce artist quality products not long after its establishment. In a short period of time, the supply of polymer paint in Australia had increased. To distinguish themselves from the competition, Vynol made the following cautionary statement in their *Vynol Colour Technical Bulletin*: 'Beware

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Figure 1. Vynol Colour 'Colourfield Matte' paint tubes. Photo: Raymonda Rajkowski, October 2015



Figure 2. Vynol Colour 'vinyl acrylic polymer emulsion artist's colour' paint tube. Photo: Raymonda Rajkowski, November 2016

of imitations – we are no longer the only Polymer Colour on the school market (although nobody else makes an Artists' range)' (Vynol 1969, 3).

This bulletin also shows that Vynol was tailoring their artists' range to abstract artists by including technical information on how to use their products to create hard-edge and stain paintings. They also targeted colourfield painters with the release of their 'Colourfield Matte' product (Figure 1). While some acrylic paint brands were attempting to imitate oil paints, this particular product emphasised the 'matte' quality of acrylic paints and an attempt was made to market these paints as a medium in their own right.

Vinyl-acrylic emulsion paints

As their brand name suggests, Vynol began by producing paints based on emulsions of vinyl-acrylic copolymers. In the 1960s, polyvinyl acetate (PVAc) paints were often internally plasticised through copolymerisation with softer acrylate monomers (such as n-butyl acrylate or 2-ethyl hexyl acrylate). PVAc homopolymer and vinyl-acrylic copolymer-based emulsion paints were released prior to the introduction of pure acrylic paints (ethyl methacrylate methyl methacrylate copolymer). Vinyl-acrylics were comparatively less expensive than acrylics, so they were readily used within the house paint industry even as acrylic emulsions became increasingly popular and widespread in use. Artist quality PVAc and PVAc/acrylic paints, however, were less common during this period, with a few examples of discontinued brands including Rowney PVA paints (United Kingdom), New Masters (California) and Reeves polymer paints (Learner 2004, 17). Vynol's product called 'vinyl acrylic polymer emulsion artist's colour' demonstrates that they belong to this small group of paint manufacturers of artist quality PVAc/acrylic paints (Figure 2).

Identifying between PVAc, vinyl-acrylic and acrylic paints can have significant implications on treatments. It can often help determine whether or not deterioration issues relate to the formulation itself. For instance, PVAc homopolymers form hard, inflexible paint films without the addition of plasticisers to soften the polymer particles. Early formulations included external plasticisers that would migrate out, resulting in a brittle and tacky surface that attracts and holds dirt (Learner 2004, 17). While vinyl-acrylic and acrylic emulsions are more flexible and durable, they too are prone to dirt absorption, due to the glass transition temperature (T_g) of their formulations, which is just below room temperature (around 10–15°C) (Learner 2012, 247). The water and solvent sensitivity of these paint films also make cleaning treatments challenging without altering or burnishing the paint surface.

Terminology

From the perspective of paint formulations, acrylic emulsions would quickly dominate the artists' paint market during the 1960s. However, there was a much broader use of the term 'acrylic'; as Cobb explains, it was generally used in industry to refer to PVAc and vinyl-acrylic paints. A recent study by Ferreira et al. (2013) encountered a similar usage of the term 'acrylic' by artists in relation to PVAc paints, indicating this blurring of terminology is not peculiar to Australia. Although the paint

formulation of acrylic is based on acrylate and methacrylate monomers, it appears the industry 'extended the terminology to cover a wide range of copolymer systems, which, in many cases, consist of predominantly vinyl monomers (particularly styrene) as well as acrylic monomers' (Thomas 1993, 222). According to *Acrylic and Other Water-based Paints for the Artist*, published in 1967, the term 'acrylics' gained preferentially widespread acceptance over the terms 'vinyl' or 'polymer' with artists' paints (Torche 1967, 27).

It is this broad use of the term 'acrylic' which is also reflected in media attributions given to works of art from this period. For instance, as part of a broader PhD study at The University of Melbourne, several paintings exhibited in *The Field* were found through FTIR media analysis to be incorrectly attributed as acrylic (results not reported in this paper). Hillary et al. (2014) reports similar issues with discrepancies between media descriptions in catalogue records and/or literature in an investigation of early synthetic emulsion paints used by New Zealand artists. Furthermore, PVAc, vinyl-acrylic and pure acrylic emulsion paints share similar visual characteristics, making them difficult to distinguish based on empirical observation alone. Their formulations also contain the same kinds of additives (surfactants, antifoaming agents, thickeners and stabilisers), which vary in properties between products and are often modified over time by manufacturers who keep their paint formulas secret. Thus, there is greater need for material investigation to be conducted on such works for authentication, treatment and art historical purposes.

ARTIST AND PAINT MANUFACTURE CONNECTIONS

Establishing connections between *Field* artists and Vynol has been of particular significance to this research. For instance, Leonard Bocour famously customised his Magna paints for Morris Louis in order for him to achieve his stain paintings. So was there a similar relationship between artist and paint manufacturer in the Australian context?

During the 1960s, art historian Terry Smith championed Australian colourfield painting through his alliance with the Central Street Gallery, founded in 1966 by one of the *Field* artists, Tony McGillick. In fact, *The Field* exhibition was considered to have directly emerged from the 'Central Street experiment' (Janiszewski 2002, 39). Smith's important contribution was his essay on 'Colour-Form Painting: Sydney 1965–1970', published in *Other Voices*, an art journal established and edited by Smith and Paul McGillick. Significantly, Vynol financially supported this journal in exchange for a full-page advertisement of Vynol artists' paints (Figure 3). This advertisement notes the importance of artists' paints in the development of formulations for the brand. It states that: 'For Vynol the trial mechanism is our Artists' Range. When the painters approve a change it is fed back into all our students products' (Smith 1970, 45).

Vynol's 1969 technical bulletin also included 14 reproductions of prints by artists represented by Central Street Gallery, all of whom are artists from *The Field*, with the exception of Max Cullen. Furthermore, one *Field* artist, Rollin Schlicht, worked with Cobb at Chromacryl Paints for

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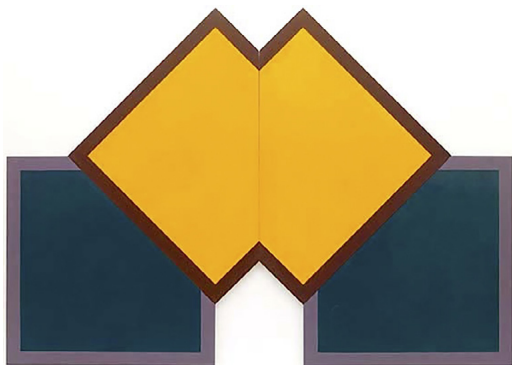


Figure 4. *Arbitrator* (1968) by Tony McGillick (1941–1992), synthetic polymer paint on shaped canvas. Four pieces: 287 × 406 cm (irreg., overall); 167.5 × 167.5 cm (irreg., each). Purchased in 2007 with funds from the Estate of Vincent Stack through the Queensland Art Gallery Foundation. Collection: Queensland Art Gallery. © Estate of Tony McGillick

a period of time in the early 1990s, during which time Cobb gave him accommodation and a studio (McGillick 2011, n.p.). Interviews with *Field* artists have revealed a familiarity with the Vynol brand and its founding members, and another study on *Field* artist Michael Johnson has identified similar links (Courlon, Ives and Dredge 2015).

McGillick is of particular significance to the connection with Vynol. According to Cobb (2016), he designed the label for their ‘vinyl acrylic polymer emulsion artist’s colour’ product (Figure 2). The label is minimal and graphic in appearance, much like McGillick’s own abstract work that utilised modular canvases. *Arbitrator* (1968), one of the paintings McGillick exhibited in *The Field*, is an example of the artist’s method of constructing identical shapes assembled together in different, symmetrical ways, with vibrant colour applied uniformly on an unprimed canvas (Figure 4). Media analysis using FTIR spectroscopy suggest this particular work is based on a vinyl-acrylic copolymer paint, rather than acrylic, as originally noted in *The Field* exhibition catalogue (Finemore 1968, 43). It is possible McGillick used this Vynol ‘vinyl acrylic polymer emulsion artist’s colour’ product to produce this work.

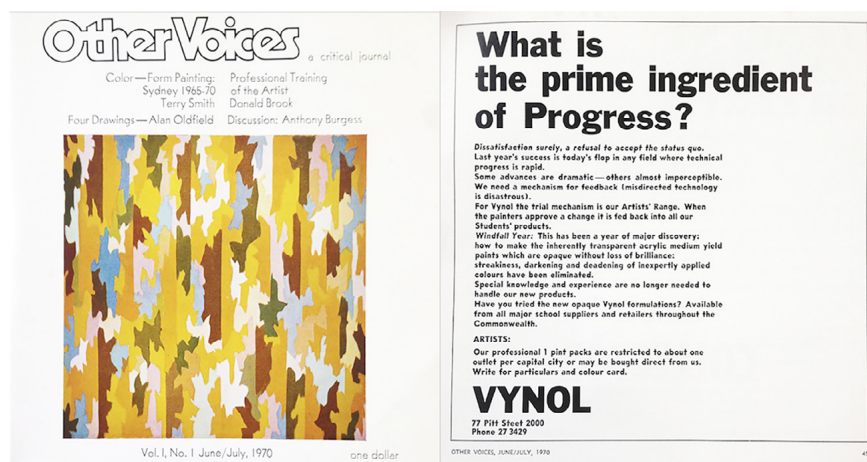


Figure 3. Front cover and Vynol Paints advertisement in *Other Voices*, vol. 1, no. 1 (June/July 1970)

METHODOLOGY

As outlined above, a range of archival sources relating to Vynol Paints (advertisements and marketing collateral) were consulted. Interviews were conducted with Vynol co-founder Jim Cobb and Steven Patterson, son of co-founder Les Patterson and current CEO of Derivan. Video-recorded interviews with *Field* artists were also undertaken and are accessible for viewing on the website www.conservingcolourfield.net (Rajkowski, Tse and Rozentals 2015). To confirm information obtained from these textual and oral sources, FTIR analysis was conducted.

Chemical analysis of four different Vynol paint lines using FTIR spectroscopy with an attenuated total reflectance (ATR) accessory was conducted with the aim of verifying the binder medium and pigments, and to discern between the vinyl-acrylic and acrylic products. A few of the labels on the Vynol paint tubes and bottles either contained limited information on the polymer resin and colourant, or were damaged or removed.

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Results are presented in Table 1 and were also compared with FTIR spectra obtained from McGillick's *Arbitrator* to identify similarities.

IR spectra of the Vynol Paint samples were collected using a Bruker Alpha-P FTIR spectrometer equipped with a diamond ATR window (Bruker Optik GmbH, Ettlingen, Germany). All spectra were recorded in a spectral range of 4000–400 cm^{-1} with 256 co-added scans at the spectral resolution of 4 cm^{-1} , and data was processed with Opus (version 6.5) software.

Table 1. FTIR-ATR analysis of four Vynol paint products

Paint name	Colour on label	FTIR—binder (characteristic bands cm^{-1})	FTIR—pigment (characteristic bands cm^{-1})	Binder result
Vynol Colour Student's Colour	White	2959, 2932, 2874, 1731, 1371, 1230, <u>1164</u> , 1009	Titanium white PW6 (415) China clay (3694, 3619)	Vinyl-acrylic copolymer
	Yellow	2960, 2933, 2874, 1733, 1234, <u>1179</u> , 1026, 911	Arylamide yellow (1670, 1593, 1513, 1567, 1310, 893, 795, 751) China clay (3693, 3620)	
	Blue	2958, 2924, 2872, 2854, 1732, 1371, 1231, <u>1162</u> , 1004	Ultramarine blue PB29 (1004, 688, 416) China clay (3695, 3620)	
Vynol / Derivan Acrylic Colour (student grade)	White	2957, 2924, 2872, 1731, 1371, 1231, <u>1163</u> , 1020	Titanium white PW6 (510) China clay (3694, 3619)	Vinyl-acrylic copolymer
	Yellow	2957, 2924, 2872, 1732, 1371, 1234, <u>1178</u> , 1008, 912	Arylamide yellow (1670, 1589, 1548, 1513, 1303, 905, 793, 747) China clay (3694, 3620)	
	Blue	2958, 2925, 1731, 1231, <u>1165</u> , 1019	Phthalocyanine blue PB15 (1610, 1509, 1335, 780, 754, 730, 522, 461) China clay (3695, 3621)	
	Red	2958, 2923, 2872, 2854, 1732, 1371, 1231, <u>1176</u> , 1017	Naphthol Scarlet PR112 (1626, 1574, 1374, 756, 695, 521) China clay (3695, 3620)	
	Green	2958, 2923, 2854, 1732, 1371, 1232, <u>1177</u> , 1021	Phthalocyanine green PG7 (1567, 1479, 1369, 1138, 946, 750, 520) China clay (3695, 3620)	
Vynol Colour (vinyl acrylic polymer emulsion artist's colour)	Raw umber	2960, 2933, 2874, 1730, 1370, 1228, <u>1167</u> , 1018, 941	Raw umber (1018, 796, 442)	Vinyl-acrylic copolymer
Vynol Colour Colourfield Matte (artist grade)	Raw umber	2954, 2873, 1728, 1451, 1384, 1237, 1022, 891, 792	Raw umber (1022, 393)	Acrylic emulsion (p-EA/MMA)
	N/A (Green)	2955, 2930, 2873, 1729, 1433, 1390, 1062	Phthalocyanine green PG7 (1508, 1390, 1305, 1275, 1209, 948, 747)	
	Phthalocyanine blue C.I.15	2953, 2924, 2872, 1727, 1450, 1379, 1247, 1092, 831	Phthalocyanine blue PB15 (1610, 1511, 1380, 754, 720, 656, 519)	

Paint samples of Tony McGillick's *Arbitrator* (1968) were analysed using a Nicolet 5700 FTIR spectrometer and Continuum microscope at Queensland Art Gallery | Gallery of Modern Art (QAGOMA). Samples were placed on a single diamond window of a ThermoFisher microcompression cell and flattened using a stainless steel roller. Spectra were collected in transmission mode using Omnic 7 software over a wavenumber range of 4000–600 cm^{-1} . Spectra are the sum of 64 scans at a resolution of 4 cm^{-1} .

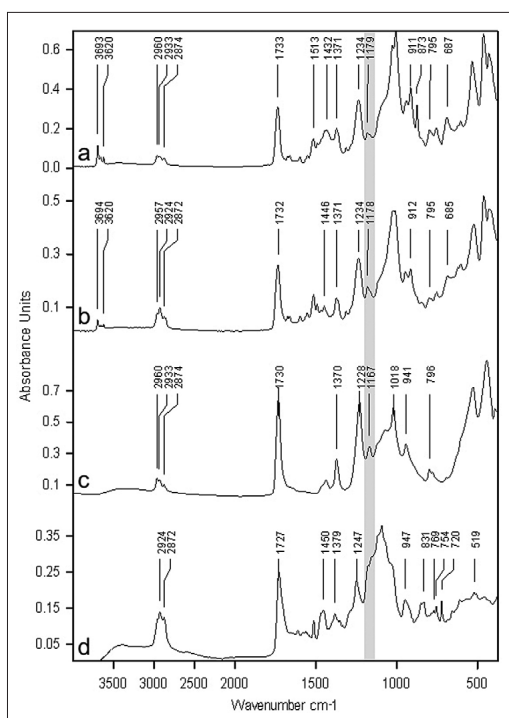


Figure 5. FTIR spectra of: a) Vynol Colour (Student Colour) (yellow); b) Vynol/Derivan Acrylic Colour (yellow); c) Vynol Colour ‘vinyl acrylic polymer emulsion artists’ colour’ (raw umber); and d) Vynol Colour Colourfield Matte (phthalocyanine blue).

This analysis draws on a recent study by Carter, Osmond and Ormsby (2014a), which showed promise with distinguishing PVAc/acrylic copolymers from PVAc homopolymers and acrylic copolymers in early Dulux household paints using FTIR spectroscopy. A small peak at around 1174 cm^{-1} was identified to be indicative of PVAc/acrylic copolymers, when present with characteristic PVAc absorption bands (strong peaks at 1243 , 1374 and 1739 cm^{-1} , and three C-H stretching peaks at 2967 , 2932 and 2877 cm^{-1}). FTIR spectroscopy is a useful technique for basic characterisation of modern paints, enabling major components to be determined. Further analysis would be required to identify the low-concentration additives commonly included in acrylic and vinyl-acrylic emulsion paint formulations.

RESULTS AND DISCUSSION

The FTIR-ATR spectroscopy results of the Vynol samples identified the resin binders, the organic and inorganic pigments present, as well as some of the extenders. Results were consistent with the corresponding paint labels (as outlined in Table 1), with the exception of one student grade paint, ‘Vynol/Derivan Acrylic Colour’, which was found to be a vinyl-acrylic copolymer. It is unclear whether this discrepancy in binder medium is limited to only this set of five paints or across the product line. Results for the artist grade paints were of primary interest, as these paints were more likely used by *Field* artists.

FTIR-ATR spectra of the four different Vynol products (Figure 5) all have the small peak at around 1174 cm^{-1} . As indicated by Carter, Osmond and Ormsby (2014a), this peak is a useful guide for quickly distinguishing the vinyl-acrylic from acrylic paints, once the diagnostic bands for PVAc are established. An additional C-H peak at 2855 cm^{-1} , as seen in one of the samples, is also indicative of a vinyl-acrylic copolymer (Carter, Osmond and Ormsby 2014a). There are differences in the fingerprint region ($900\text{--}1500\text{ cm}^{-1}$) in the FTIR spectra for the Vynol Colour ‘Colourfield Matte’ that suggest it is an acrylic emulsion, most likely a poly(ethyl acrylate/methyl methacrylate) copolymer. This includes two distinct peaks at 1450 and 1379 cm^{-1} , similar in intensity, as well as characteristic peaks at 1247 cm^{-1} and 1092 cm^{-1} . However, the carbonyl stretch at 1727 cm^{-1} (used to distinguish acrylic resins from other types of paint) and the main C-H stretches at 2953 , 2924 and 2872 cm^{-1} are very similar to the vinyl-acrylic samples, except for the overall profile, which appears more well defined.

Spectra for the three ‘Colourfield Matte’ paint samples exhibit a broad shape to the strongest band in the C-O and C-C stretching region, between 1000 and 1300 cm^{-1} , suggestive of a possible matting agent such as silica (Learner 2004). However, the two smaller characteristic peaks for silicon dioxide (812 and 478 cm^{-1}) are masked by the colourant, common for phthalocyanine green and blue colours, which have numerous intense absorptions in this region. A china clay (hydrated aluminum silicate) extender in the student grade paint samples is more discernible with its distinctive sharp peaks at 3695 and 3621 cm^{-1} .

FTIR spectra results for the brown paint of McGillick’s *Arbitrator* also exhibit infrared absorption bands suggestive of china clay, more specifically

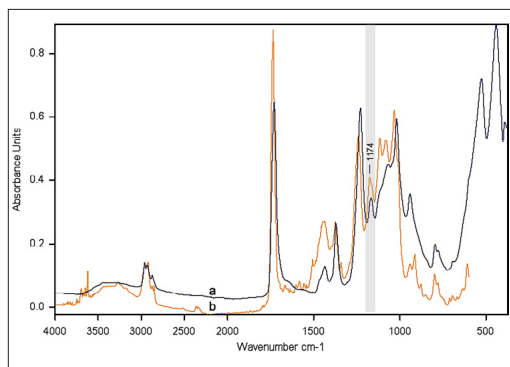


Figure 6. FTIR spectra comparing: a) Vynol 'vinyl acrylic emulsion artist's colour' (raw umber); and b) McGillick's *Arbitrator* (1968). The highlighted band shows the 1174 cm⁻¹ peak

peaks at 3649 and 3620 cm⁻¹, and stronger peaks at 1116 and 1081 cm⁻¹ (Figure 6). Overlaid with the spectra of the Vynol 'vinyl acrylic polymer emulsion artist's colour' raw umber paint sample, a few similar features are apparent. Most significant is the vinyl-acrylic copolymer peak at 1174 cm⁻¹, along with the diagnostic PVAc bands (namely a strong rounded peak centred at 1240 cm⁻¹) and additional small peak at 2850 cm⁻¹. Other infrared peaks corresponding to those characteristic of the raw umber pigment (1032, 940 and 796 cm⁻¹), can be verified with x-ray fluorescence through the detection of the elements iron and manganese.

Results discussed have consistently demonstrated that the peak at around 1174 cm⁻¹ is an effective indicator of PVAc/acrylic copolymers (Figure 5), supporting the findings of Carter, Osmond and Ormsby (2014a). However, their results were not conclusive due to this peak range being masked by extenders (like barium sulfate) and inconsistencies with pyrolysis-gas chromatography mass spectroscopy (Py-GC/MS) results of the same PVAc/acrylic samples of early Dulux house paint. Artist quality paints may not present as many challenges, as their formulations tend to include less extenders than other forms of commercial paints (Learner 2004, Ormsby et. al. 2012). Furthermore, abstract painters were more likely to use paint straight from the tube or bottle to achieve areas of flat, uniform colour, which can result in FTIR spectra aligning more closely with reference datasets of historical paints.

CONCLUSION

This is the first historical and scientific investigation to be undertaken on this early Australian acrylic paint brand, Vynol. Results show Vynol's close connection to artists who exhibited in *The Field*, reflecting a two-way relationship that contributed to the simultaneous development of acrylic paint manufacture and colourfield painting in Australia. Vynol's 'Colourfield Matte' product is a unique example of a manufacturer directly aligning its paints to this particular stylistic movement. Vynol is also discussed in relation to their vinyl-acrylic copolymer paints, which is not documented in Australian technical art history. FTIR results are primarily considered in relation to spectral features that have the potential to distinguish vinyl-acrylic copolymers from acrylic and PVAc paints. This has practical implications for dating artworks and can help inform cleaning treatments and address deterioration issues that vary between these polymer families. This research is particularly significant as acrylic paintings created in the 1960s, especially those displayed in *The Field* exhibition, have attracted renewed interest into the long-term stability and conservation of these important abstract works.

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