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## Molecular and structural characterization of some violet phosphate pigments for their non invasive identification in modern paintings

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### Abstract

A complete non-invasive characterization by XRF, XRD, near-FTIR and UV-Vis reflectance spectroscopy has been performed on some commercially available violet pigments as well as on pure violet Co-salts also known to be used as pigments. The obtained results show that, after a preliminary elemental characterization, the studied pigments can be easily identified by near-FTIR and UV-Vis spectroscopies since they exhibit peculiar spectral bands in these regions. Among the analysed samples emerged that the pigment 45350- "Manganviolett" from Kremer consists of two  $\alpha$ - and  $\beta$ - $\text{NH}_4\text{MnP}_2\text{O}_7$  polymorphs, being  $\alpha$ - $\text{NH}_4\text{MnP}_2\text{O}_7$  the most abundant one; furthermore we found that the pigment R1215D -"Cobalt violet" by Winsor & Newton (no longer available since 2006) displays spectral features that match exactly those of 45820-"Kobaltviolett hell" from Kremer and both are composed by cobalt ammonium phosphate hydrate. Such non-invasive study allowed for the identification of "Manganese Violet" ( $\alpha$ - $\text{NH}_4\text{MnP}_2\text{O}_7$ ) and anhydrous cobalt phosphate ( $\text{Co}_3(\text{PO}_4)_2$ ), on some Boccioni's paintings during MOLAB *in situ* measurements at the *Museo del Novecento* (Milano).

*Key words: violet phosphate pigments, non-invasive identification, near-infrared spectroscopy, UV-Vis, XRD, XRF, modern paintings*

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