

# Pigments

## 1. Pigment name

**ID and name:** OP1 material\_pigment\_name

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Name(s) of the pigment.

**Allowed values and other constraints:** controlled vocabulary

## 2. Pigment form

**ID and name:** OP2 material\_pigment\_archaeological\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** In which shape/form was the pigment found in the archaeological context?

**Allowed values and other constraints:** free text

**Example:** pellets; as part of a fresco

## 3. Pigment type

**ID and name:** OP3 material\_pigment\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about the pigment type.

*with the two subproperties:*

### 3.1 Type

**ID and name:** OP3.1 material\_pigment\_type\_chemistry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Is it an organic or inorganic pigment?

**Allowed values and other constraints:** controlled vocabulary

### 3.2 Occurrence

**ID and name:** OP3.2 material\_pigment\_type\_production  
**Provided by:** data provider  
**Obligation:** recommended  
**Occurrences:** 0–1  
**Definition:** Is it a natural or synthetic pigment?  
**Allowed values and other constraints:** controlled vocabulary

## 4. Pigment composition

**ID and name:** OP4 material\_pigment\_composition  
**Provided by:** data provider  
**Obligation:** mandatory  
**Occurrences:** 1  
**Definition:** The chemical and/or mineralogical composition of the pigment. At least one of its subproperties must be provided.

*with the three subproperties:*

### 4.1 Chemical composition

**ID and name:** OP4.1 material\_pigment\_composition\_chemistry  
**Provided by:** data provider  
**Obligation:** recommended  
**Occurrences:** 0–n  
**Definition:** If it is an inorganic pigment, the chemical composition of the pigment.

*with the eight subproperties:*

#### 4.1.1 Analytical method

**ID and name:** B4.1 chemistry\_method  
**Provided by:** data provider  
**Obligation:** mandatory  
**Occurrences:** 1  
**Definition:** The method used to determine the chemical composition.  
**Allowed values and other constraints:** controlled vocabulary

#### 4.1.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound  
**Provided by:** data provider  
**Obligation:** mandatory  
**Occurrences:** 1–n  
**Definition:** The analysed chemical compound (chemical element or oxide).  
**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in `B4.1 Analytical method`.

#### 4.1.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in `B4.1 Analytical method`.

#### 4.1.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

#### 4.1.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

#### 4.1.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value  
**Provided by:** data provider  
**Obligation:** recommended  
**Occurrences:** 0–n  
**Definition:** Value of the absolute analytical uncertainty.  
**Allowed values and other constraints:** decimal number  
**Example:** 0.3

## 4.2 Organic compounds

**ID and name:** OP4.2 material\_pigment\_composition\_compound  
**Provided by:** data provider  
**Obligation:** recommended  
**Occurrences:** 0–n  
**Definition:** The (main) organic compounds in the pigment.  
**Allowed values and other constraints:** controlled vocabulary

## 4.3 Mineralogical composition

**ID and name:** OP4.3 material\_pigment\_composition\_mineral  
**Provided by:** data provider  
**Obligation:** recommended  
**Occurrences:** 0–n  
**Definition:** If it is mineral pigment, which minerals are present?

*with the two subproperties:*

### 4.3.1 Mineral name

**ID and name:** OP4.3.1 material\_pigment\_composition\_mineral\_name  
**Provided by:** data provider  
**Obligation:** mandatory  
**Occurrences:** 1  
**Definition:** Name of the mineral approved by the International Mineralogical Association (IMA).  
**Allowed values and other constraints:** controlled vocabulary ([IMA list of minerals](#)), retrieved from the Mindat API

### 4.3.2 Mineral ID

**ID and name:** OP4.3.2 material\_pigment\_composition\_mineral\_id  
**Provided by:** Mindat API  
**Obligation:** mandatory  
**Occurrences:** 1  
**Definition:** The Mindat ID of the mineral.  
**Allowed values and other constraints:** Value in the `id` field of a Mindat mineral record.

## 5. Pigment production

**ID and name:** OP5 material\_pigment\_processing

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about the production context and processing steps of the pigment.

*with the three subproperties:*

## 5.1 Production context

**ID and name:** OP5.1 material\_pigment\_production\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The production context the object is related to.

**Allowed values and other constraints:** controlled vocabulary

## 5.2 Treatment

**ID and name:** OP5.2 material\_pigment\_production\_treatment

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Which treatments were done to the raw material(s) to produce the pigment?

**Allowed values and other constraints:** controlled vocabulary

## 5.3 Details

**ID and name:** OP5.3 material\_pigment\_production\_details

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Additional information about the production context.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 6. Colour

**ID and name:** OP6 material\_pigment\_colour

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The colour of the pigment.

*with the two subproperties:*

## 6.1 Name

**ID and name:** OP6.1 material\_pigment\_colour\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** General colour of the pigment.

**Allowed values and other constraints:** free text

**Example:** blue; 5P 5/10; L56 a26 b\*3

## 6.2 Colour system

**ID and name:** OP6.2 material\_pigment\_colour\_system

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The colour system used to determine the colour.

**Allowed values and other constraints:** controlled vocabulary

## 7. Pigment alteration

**ID and name:** OP7 material\_pigment\_alteration

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the alteration of the pigment.

*with the two subproperties:*

### 7.1 Alteration type

**ID and name:** OP7.1 material\_pigment\_alteration\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of the observed alteration process.

**Allowed values and other constraints:** controlled vocabulary

### 7.2 Details

**ID and name:** OP7.2 material\_pigment\_alteration\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Additional information about the observed alteration or its productions.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 8. Pigment recycling

**ID and name:** OP8 material\_pigment\_recycling

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about whether the pigment was recycled or reused.

*with the two subproperties:*

### 8.1 Indicators

**ID and name:** OP8.1 material\_pigment\_recycling\_indicator

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Does the pigment show indicators for recycling or reuse?

**Allowed values and other constraints:** controlled vocabulary

### 8.2 Reasoning

**ID and name:** OP8.2 material\_pigment\_recycling\_reason

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Observed indicators for recycling or reuse.

**Allowed values and other constraints:** free text

**Example:** presence of Sn in trace element analysis

## 9. Lead source

**ID and name:** OP9 material\_pigment\_lead\_source

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The source of lead in the pigment.

**Allowed values and other constraints:** controlled vocabulary

## 10. Provenance indicators

**ID and name:** OP10 material\_pigment\_raw\_material\_provenance

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about provenance, if known from other sources.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 11. Sr isotopes

**ID and name:** OP11 material\_pigment\_isotopes\_Sr

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the pigment.

*with the two subproperties:*

### 11.1 Value

**ID and name:** OP11.1 material\_pigment\_isotopes\_Sr\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio.

**Allowed values and other constraints:** decimal number

**Example:** 0.7856

### 11.2 Analytical precision

**ID and name:** OP11.2 material\_pigment\_isotopes\_Sr\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** 0.0002

## 12. Nd isotopes

**ID and name:** OP12 material\_pigment\_isotopes\_Nd

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\epsilon\text{Nd}$  value of the pigment.

*with the two subproperties:*

## 12.1 Value

**ID and name:** OP12.1 material\_pigment\_isotopes\_Nd\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\epsilon\text{Nd}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 12.2 Analytical precision

**ID and name:** OP12.2 material\_pigment\_isotopes\_Nd\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon\text{Nd}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

# 13. Hf isotopes

**ID and name:** OP13 material\_pigment\_isotopes\_Hf

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\epsilon\text{Hf}$  value of the pigment.

*with the two subproperties:*

## 13.1 Value

**ID and name:** OP13.1 material\_pigment\_isotopes\_Hf\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\epsilon\text{Hf}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 13.2 Analytical precision

**ID and name:** OP13.2 material\_pigment\_isotopes\_Hf\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon\text{Hf}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.