

---

## Supplementary materials

*Article*

# Assessment of easily accessible spectroscopic techniques coupled with multivariate analysis for the qualitative characterization and differentiation of earth pigments of various provenance

Ioana Maria Cortea, Luminița Ghervase, Roxana Rădvan and George Seritan

---

**Figure S1.** Elemental distribution for all analyzed pigments

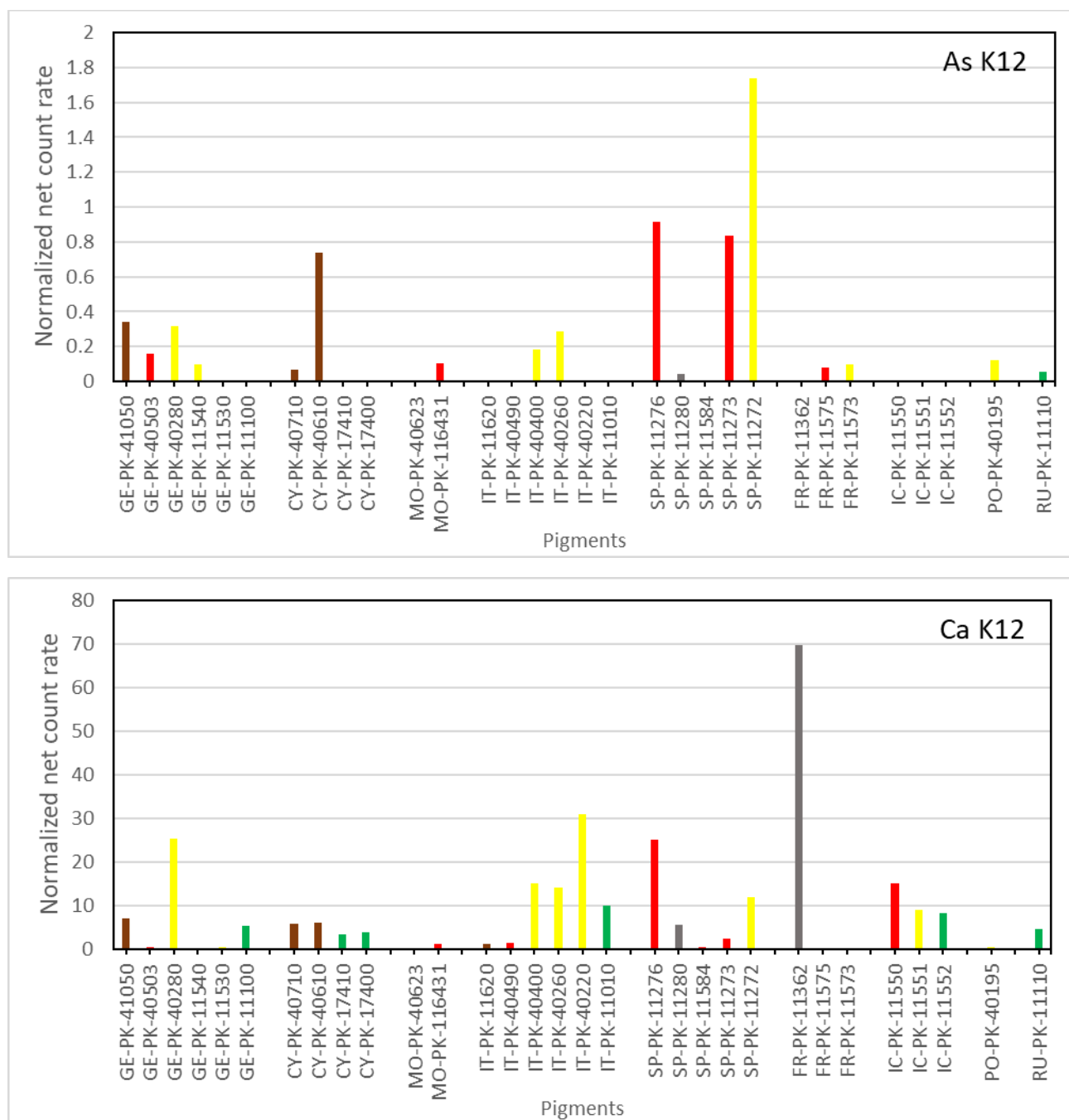
**Figure S2.** Raw XRF data (full data set)

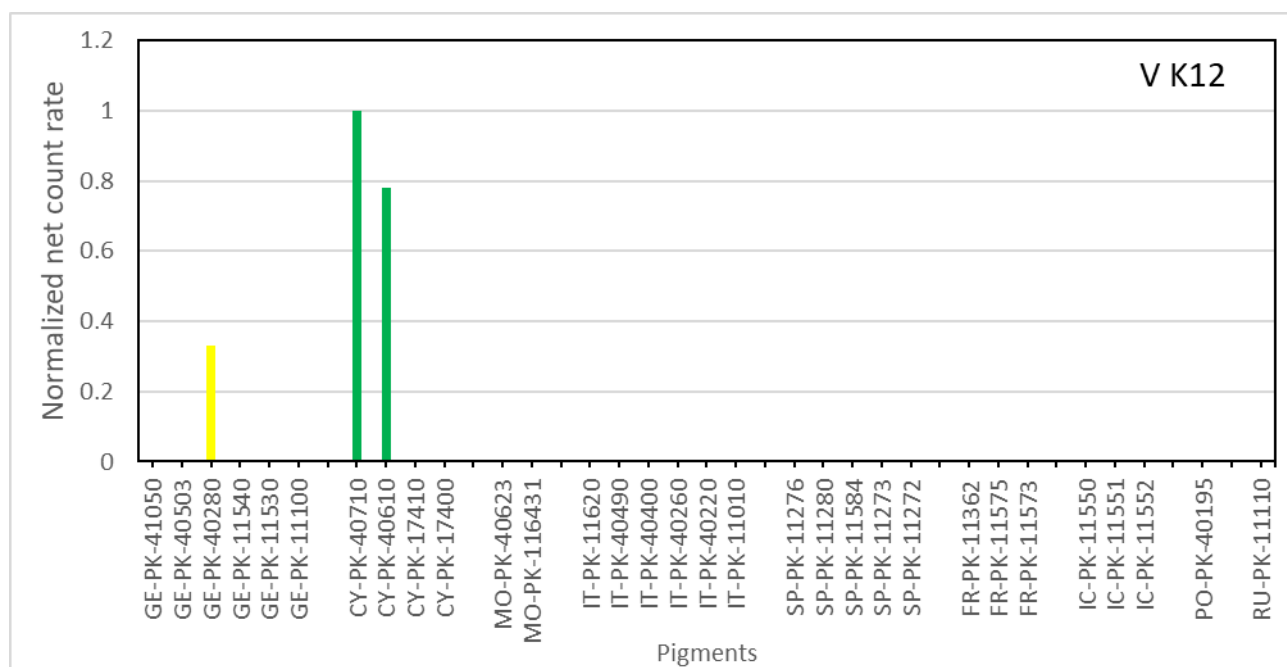
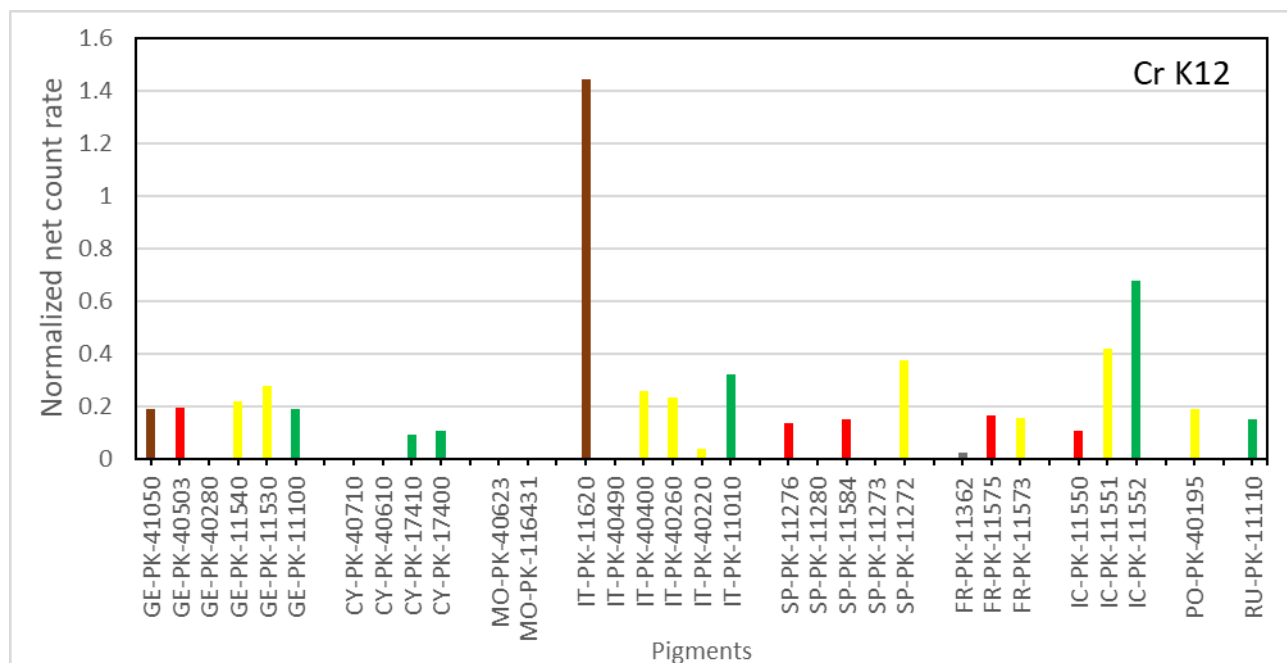
**Figure S3.** Raw Raman data (785 nm)<sup>1</sup>

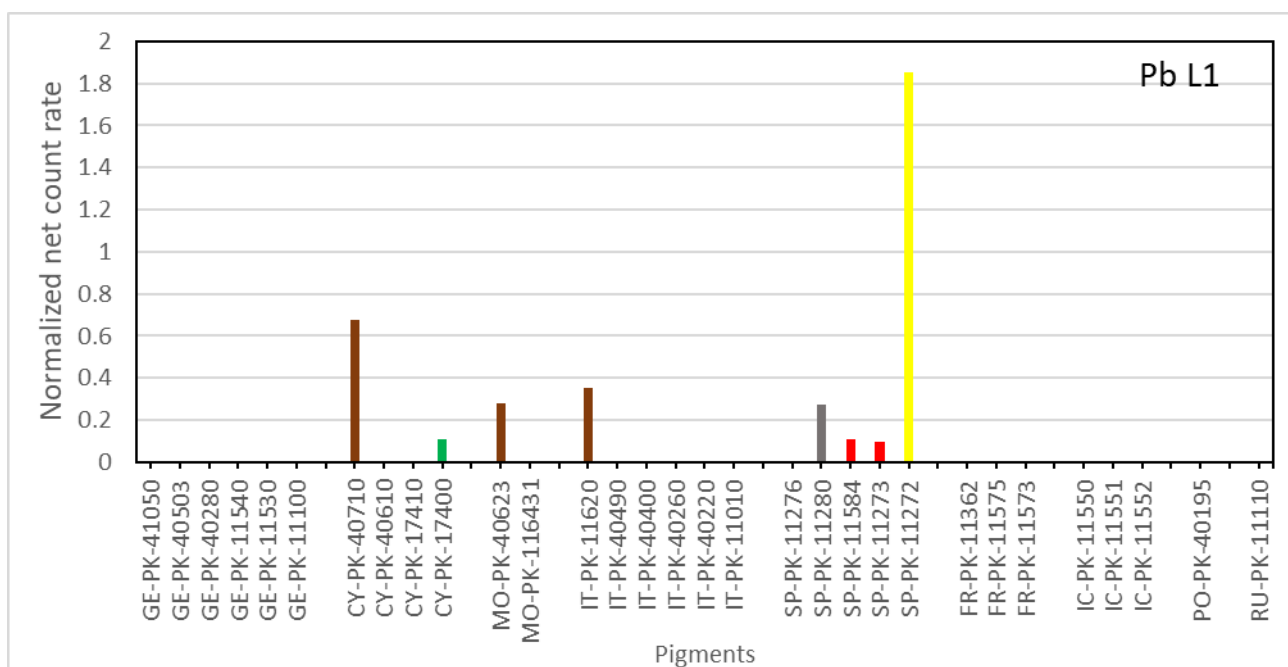
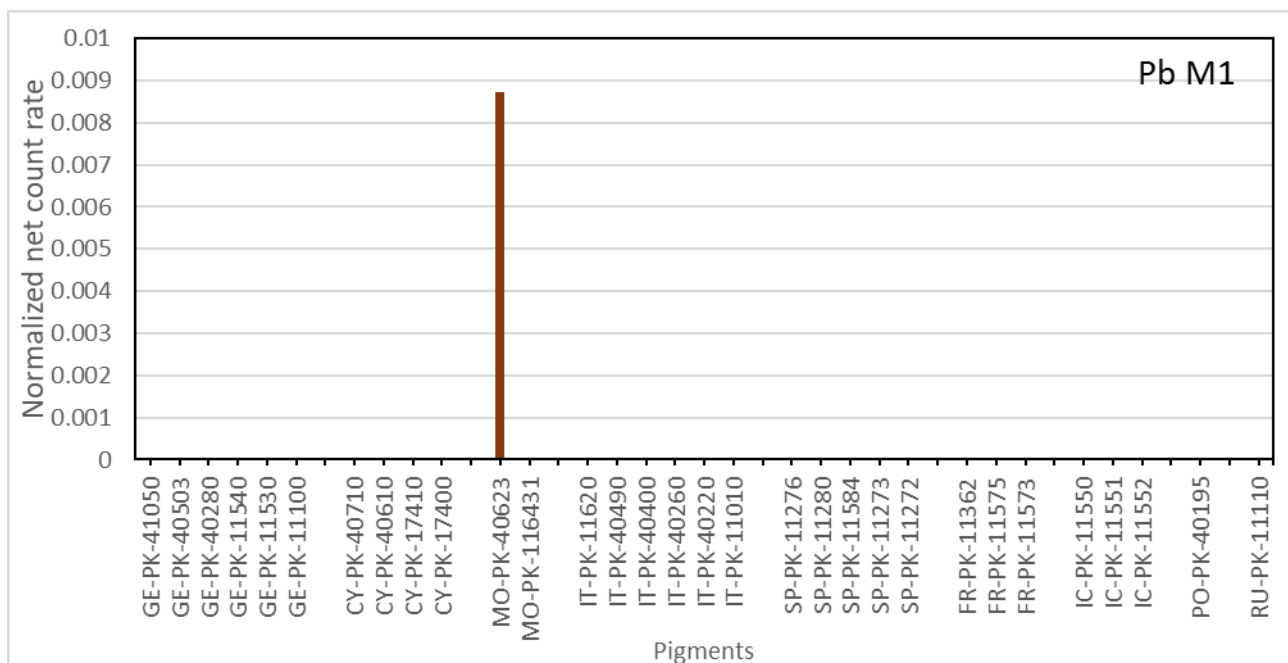
**Figure S4.** Loading plots (FTIR-PCA)

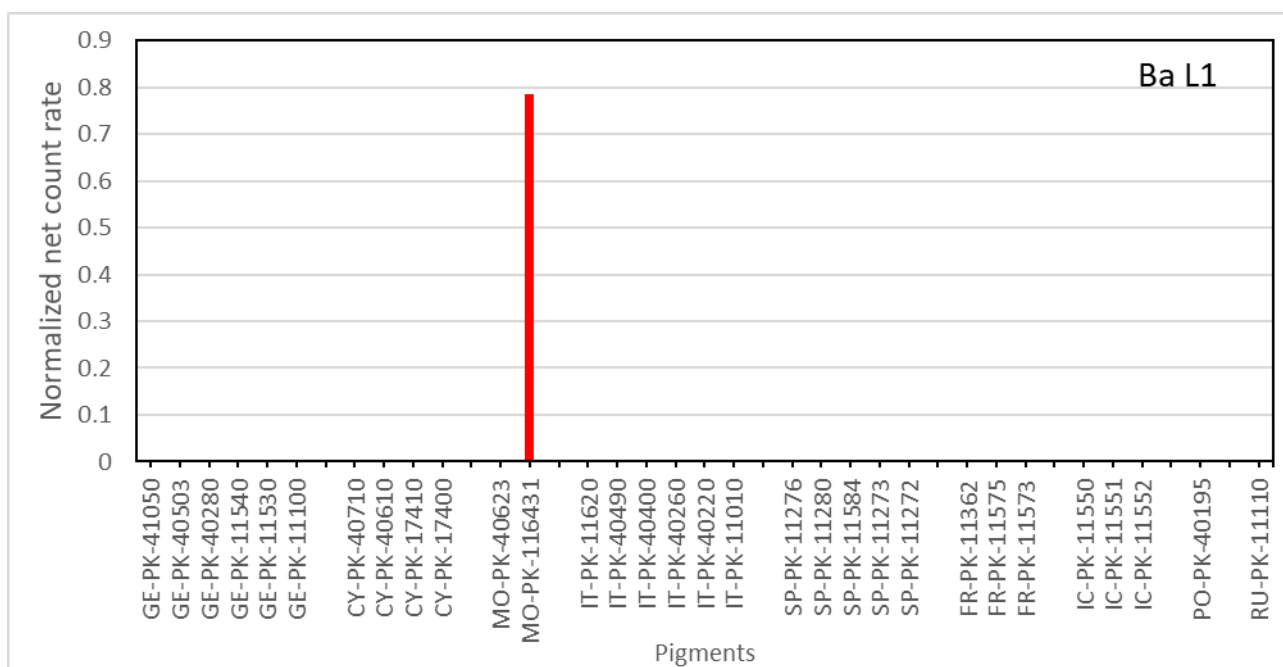
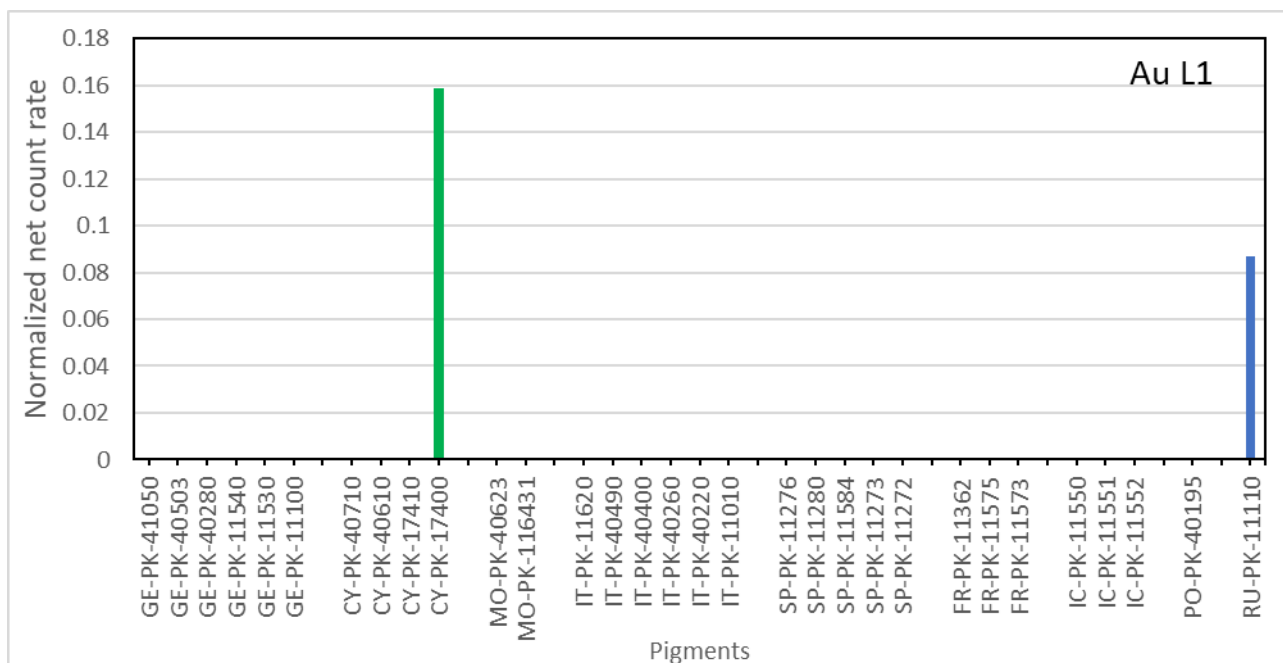
---

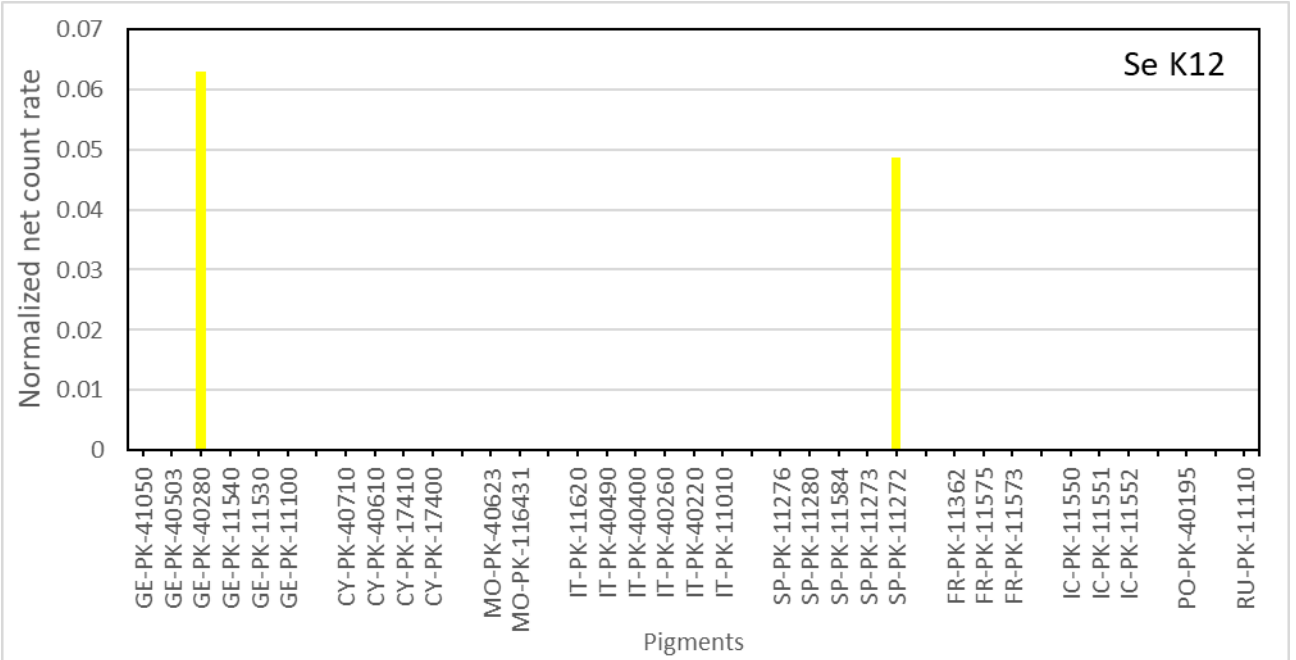
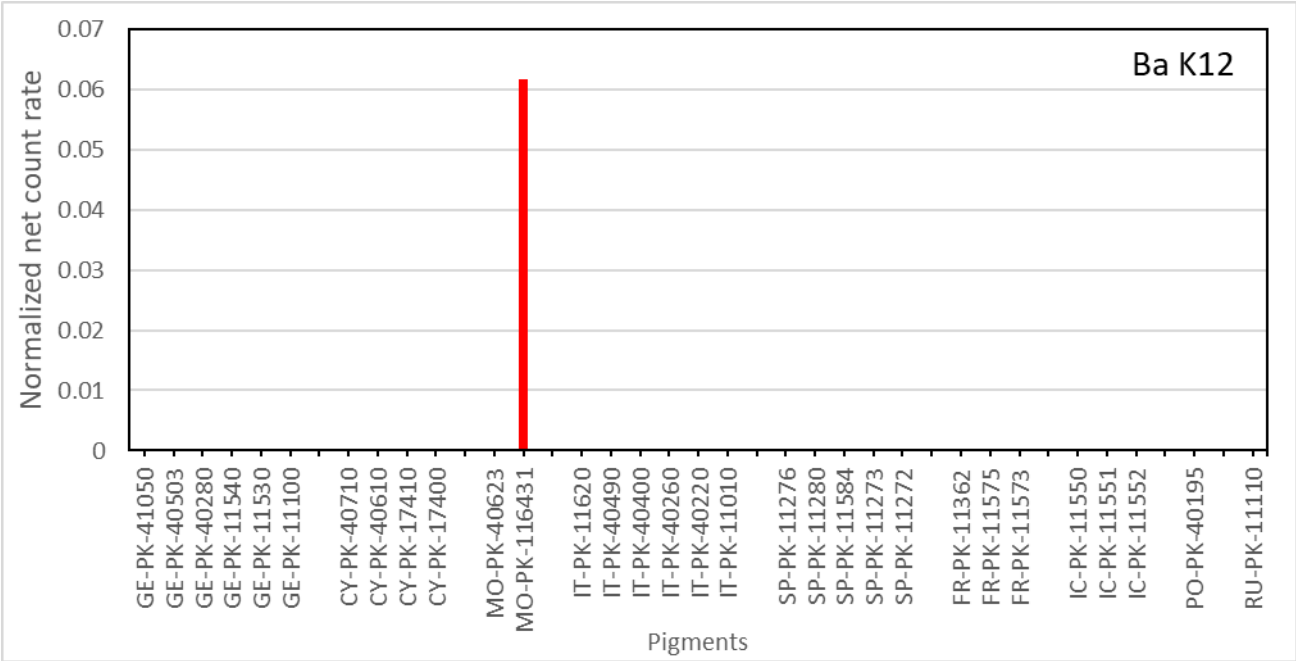
<sup>1</sup> some of the investigated pigments could not be characterized because of the strong luminescence they exhibit with the 785 nm excitation wavelength

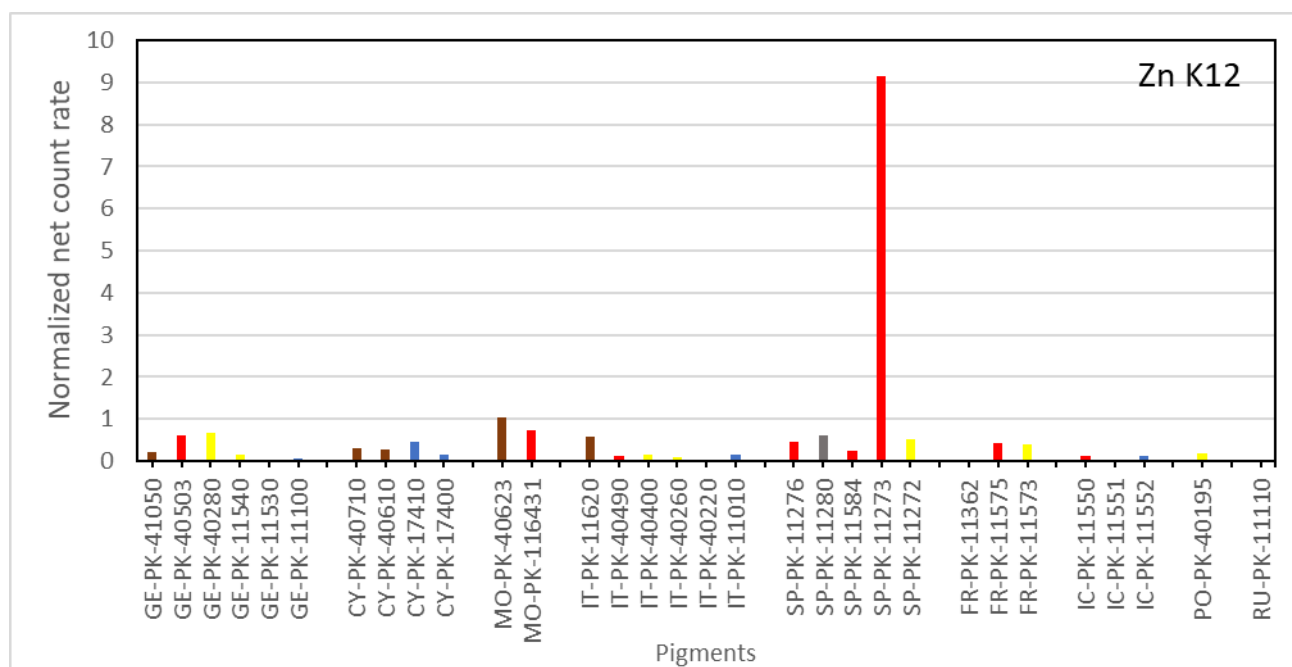
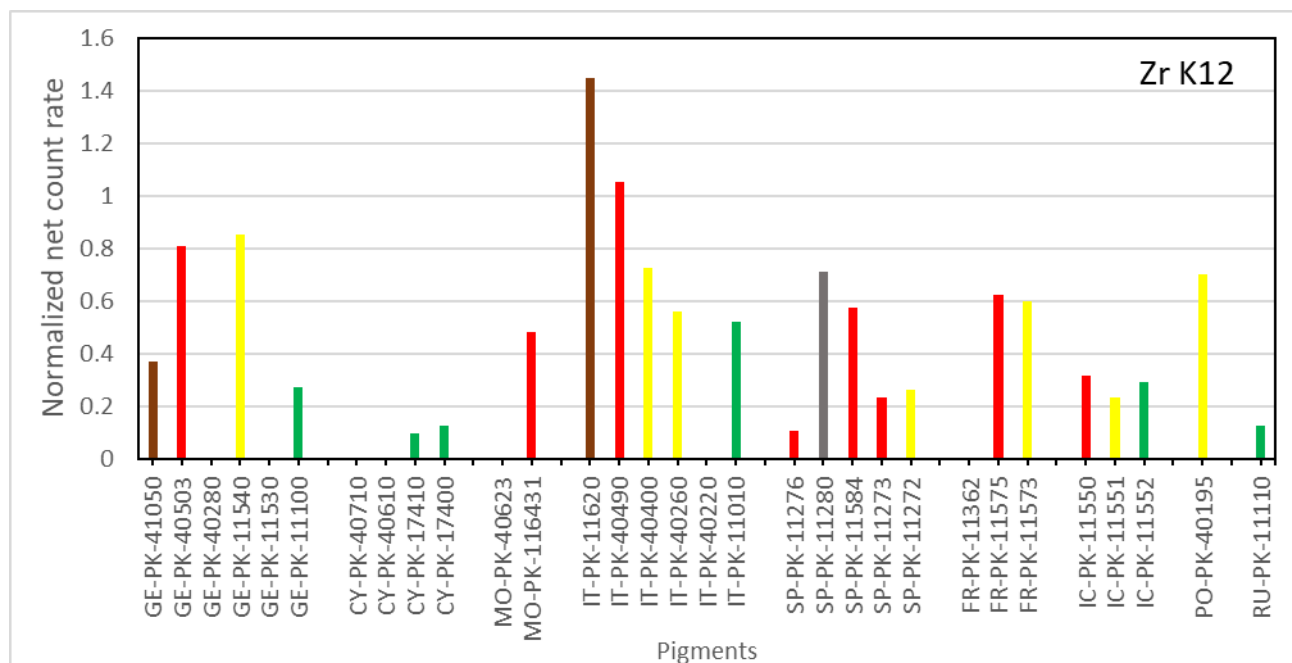
**Figure S1.** Elemental distribution for all analyzed pigments

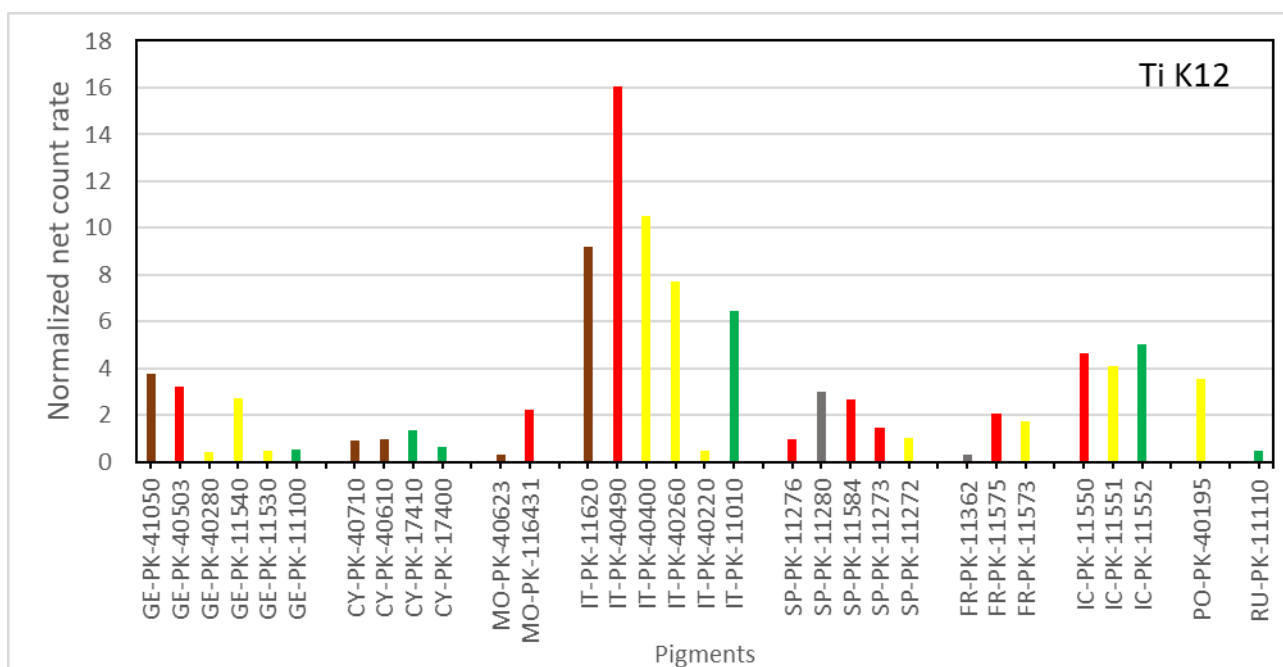
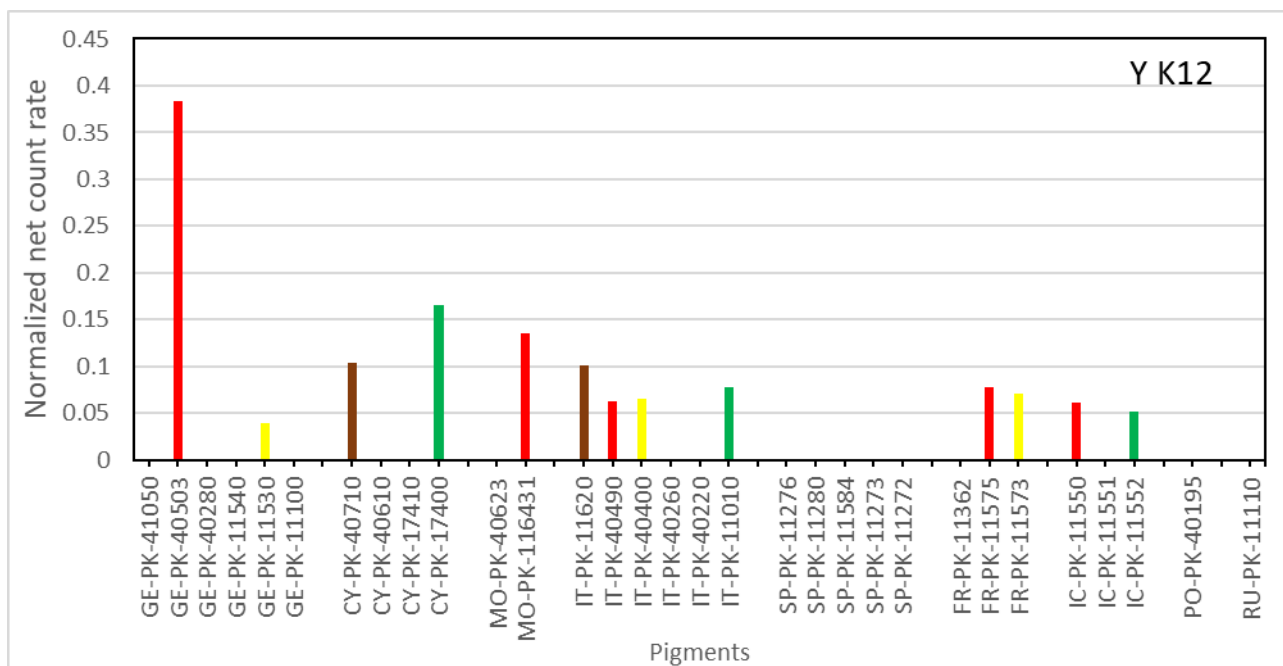




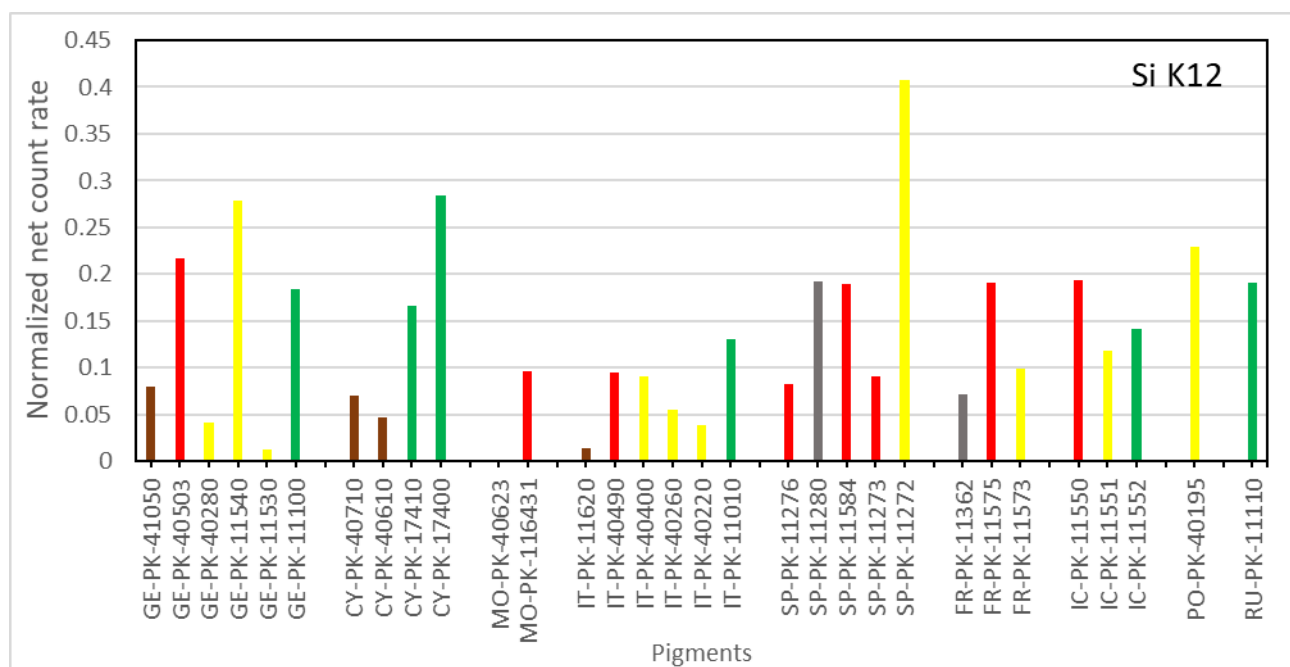
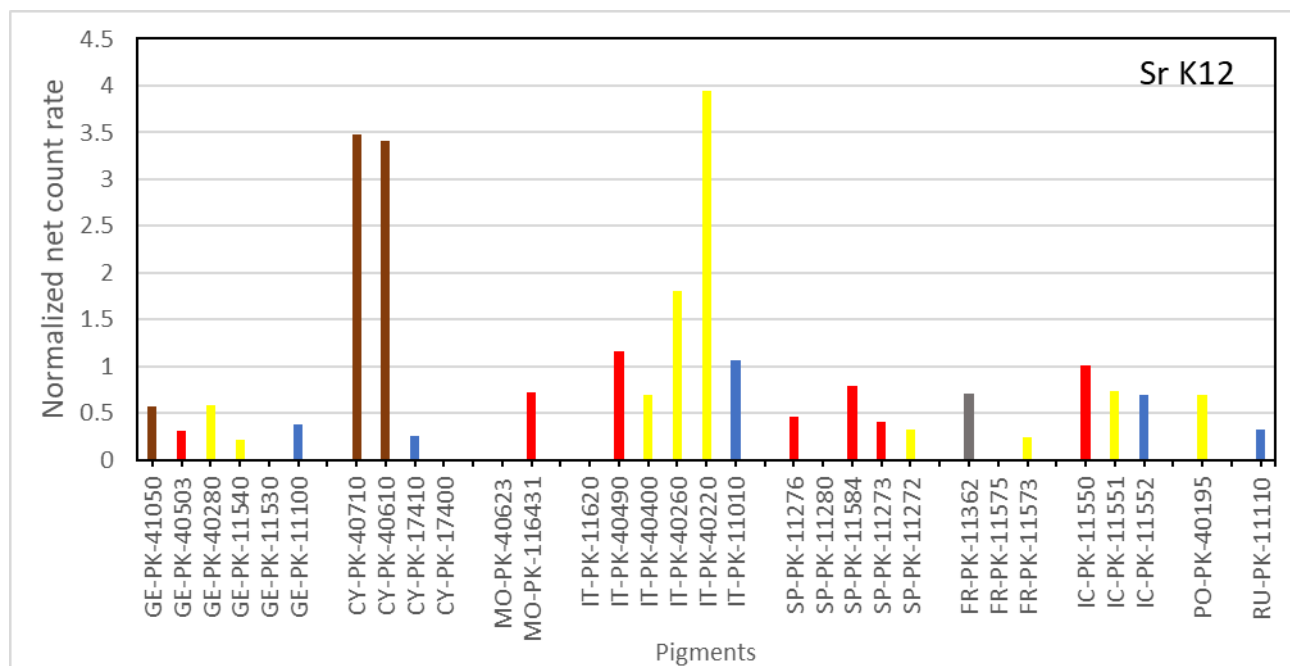


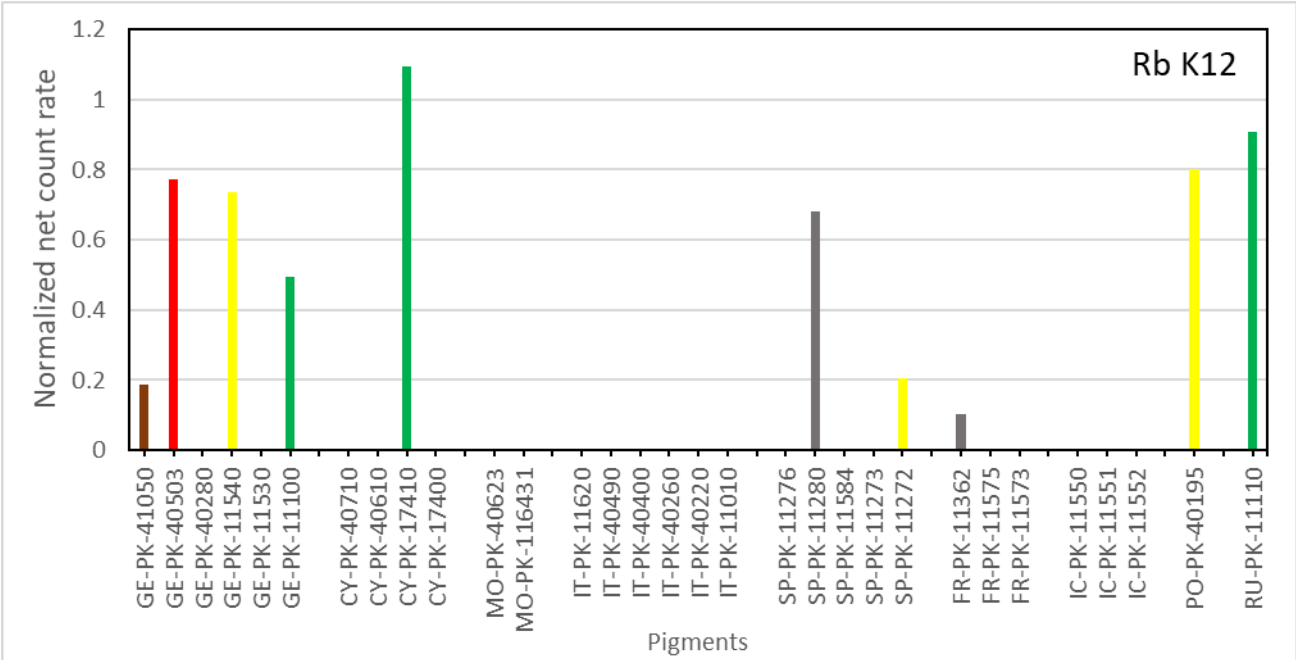
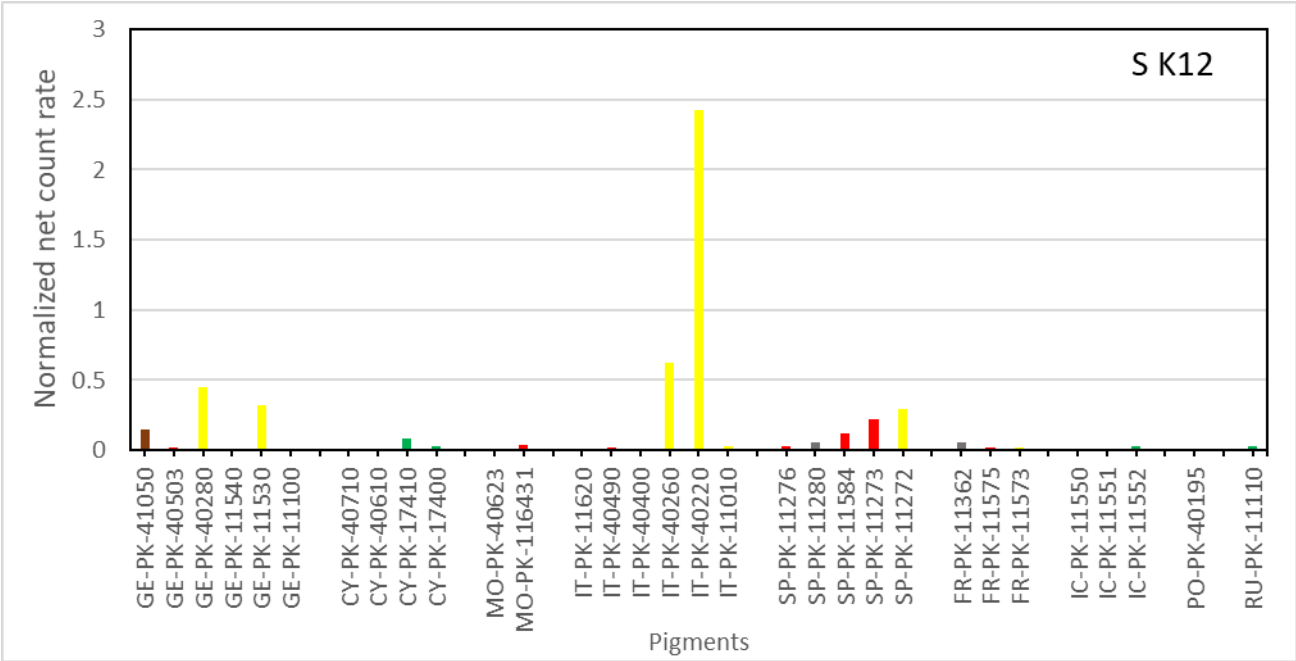


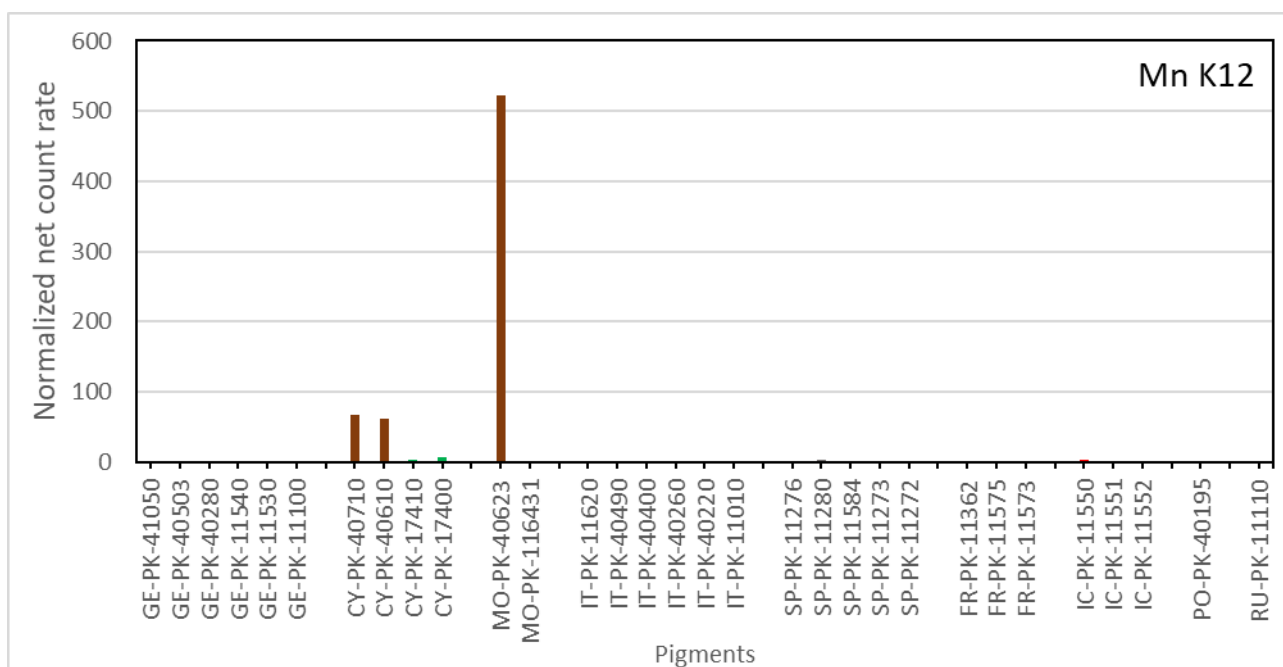
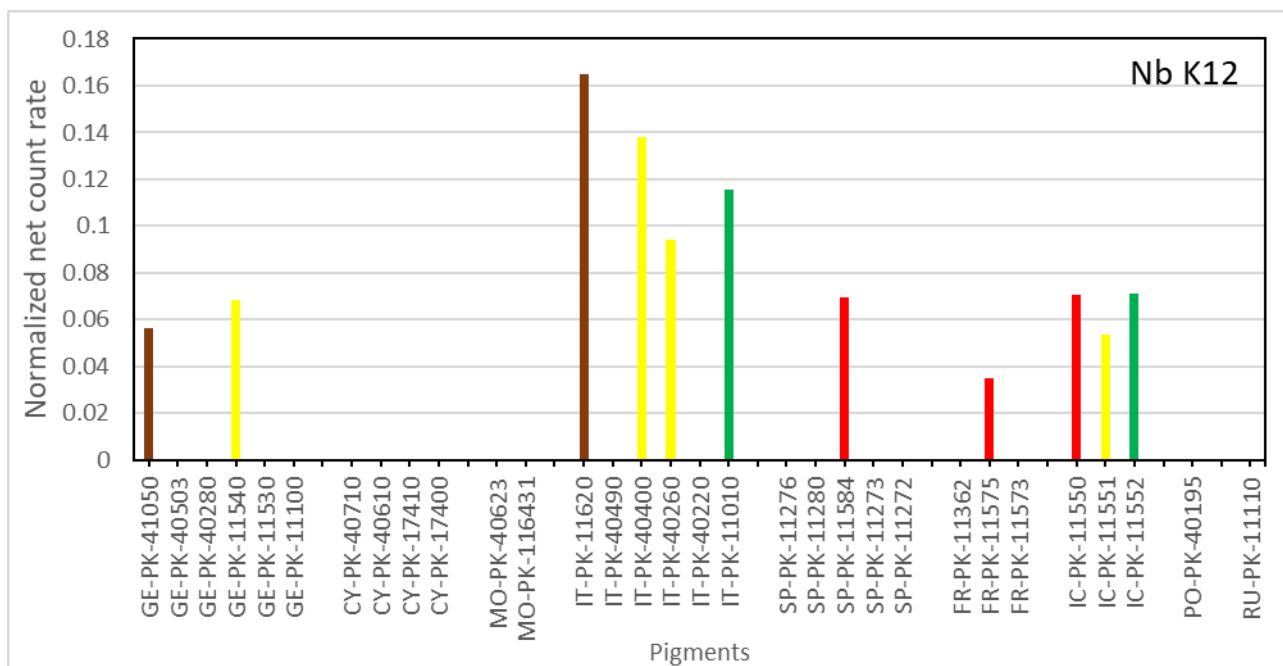


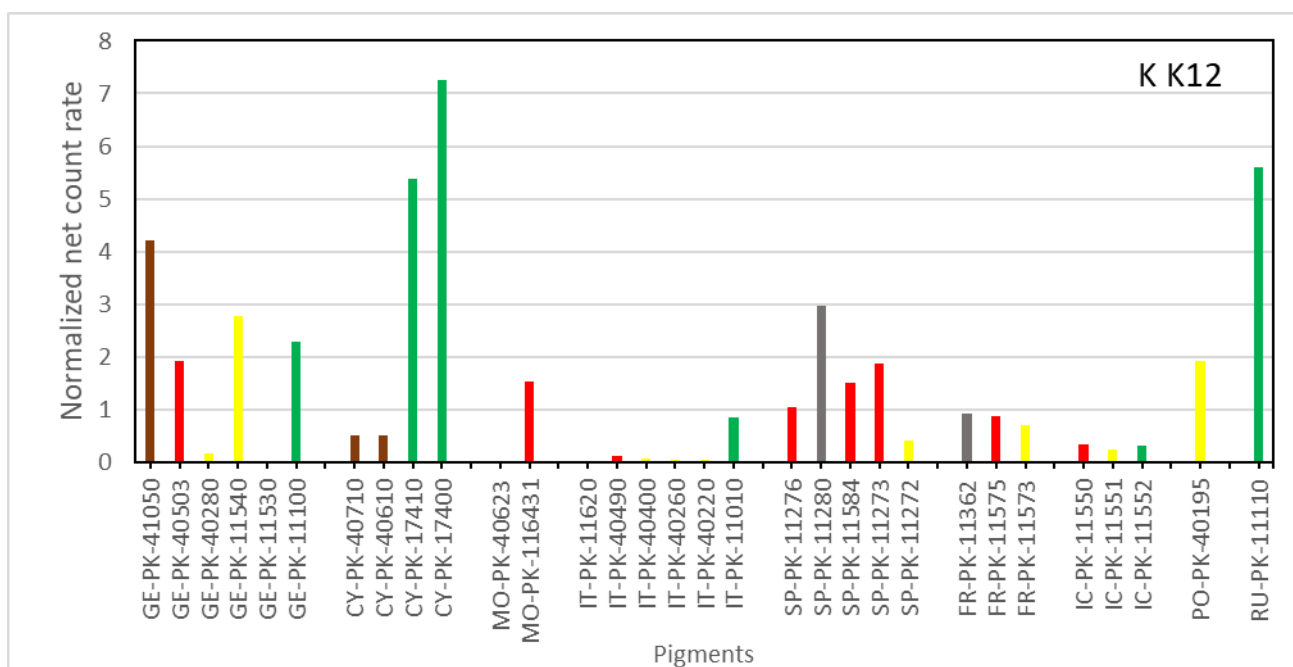
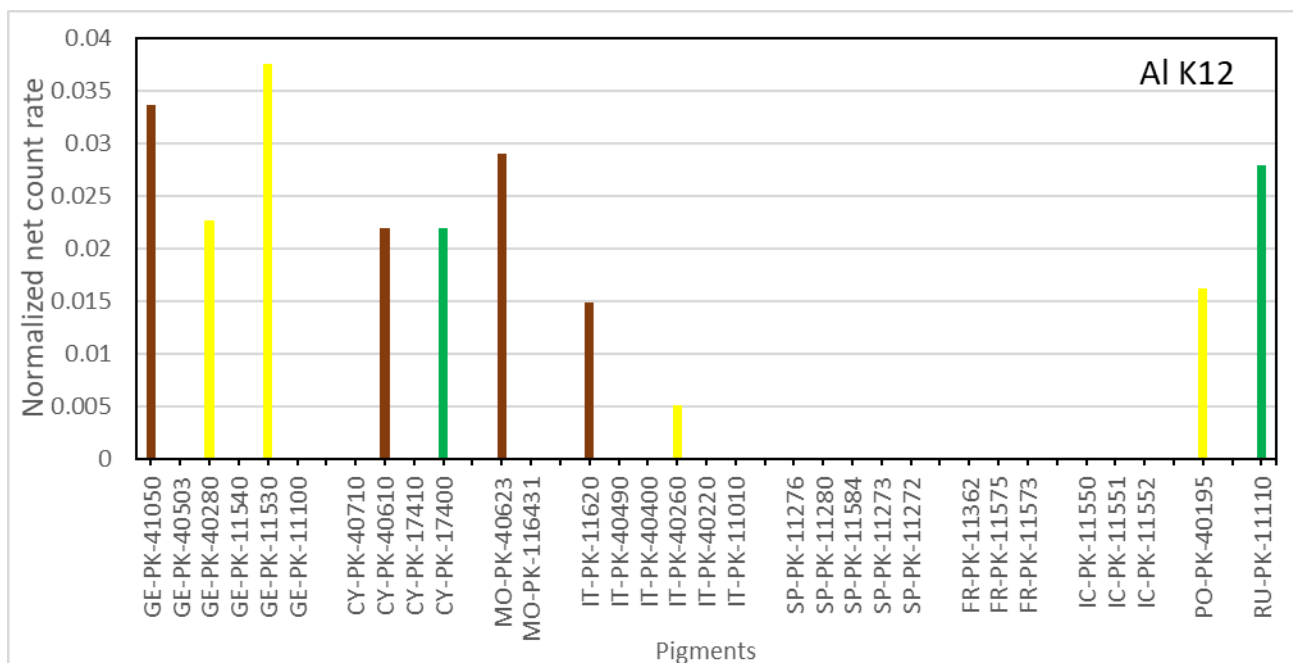


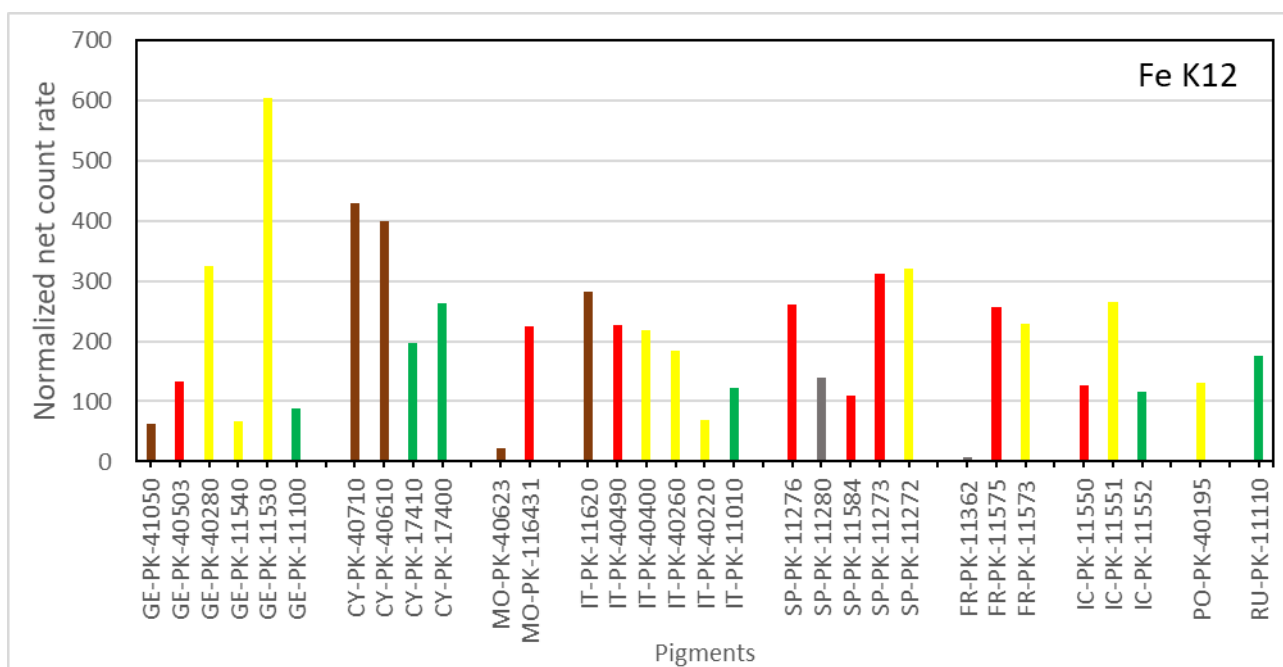
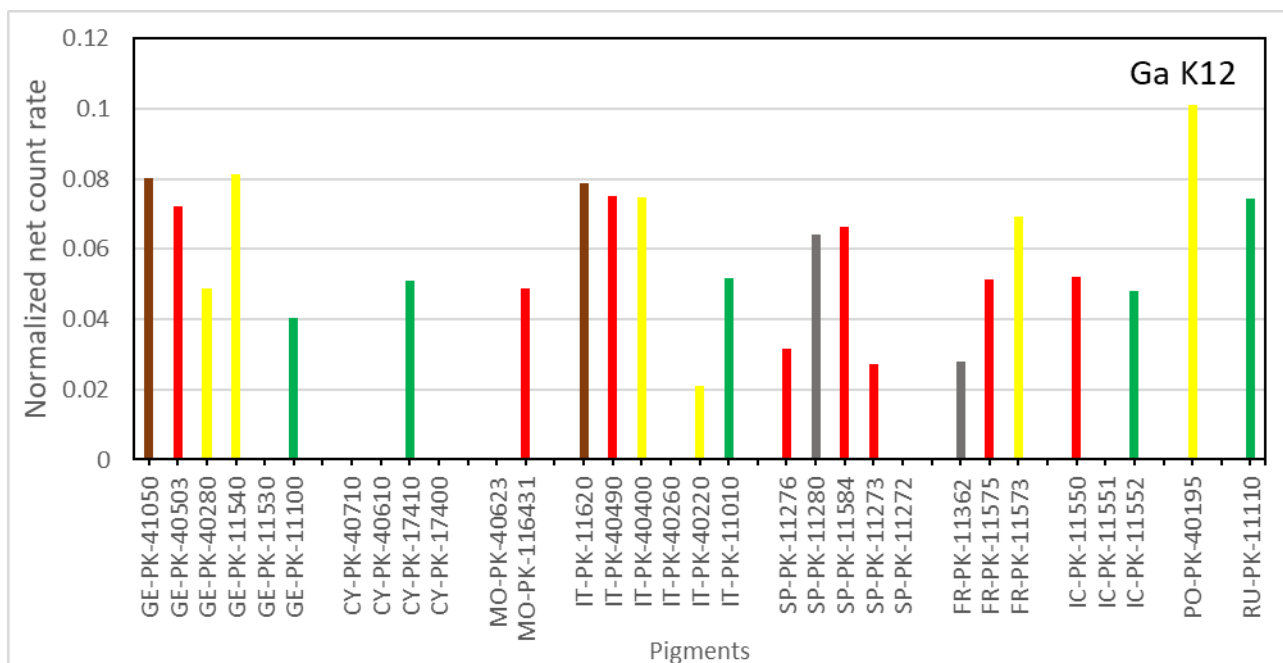


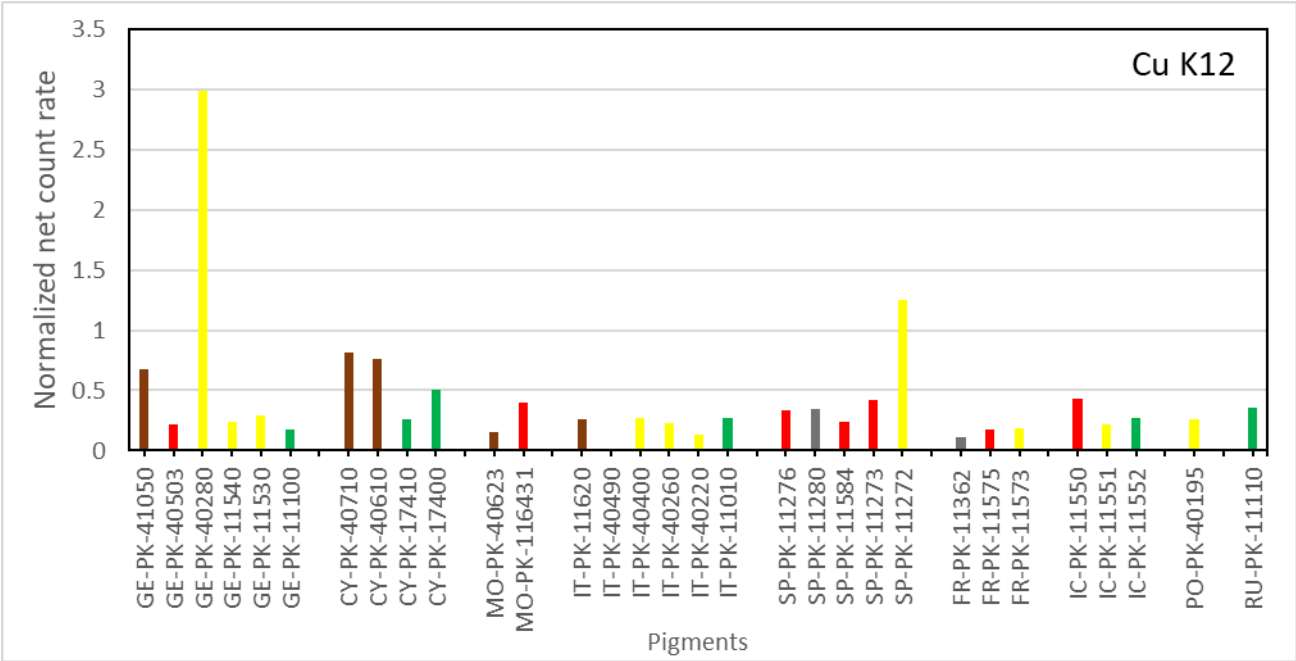


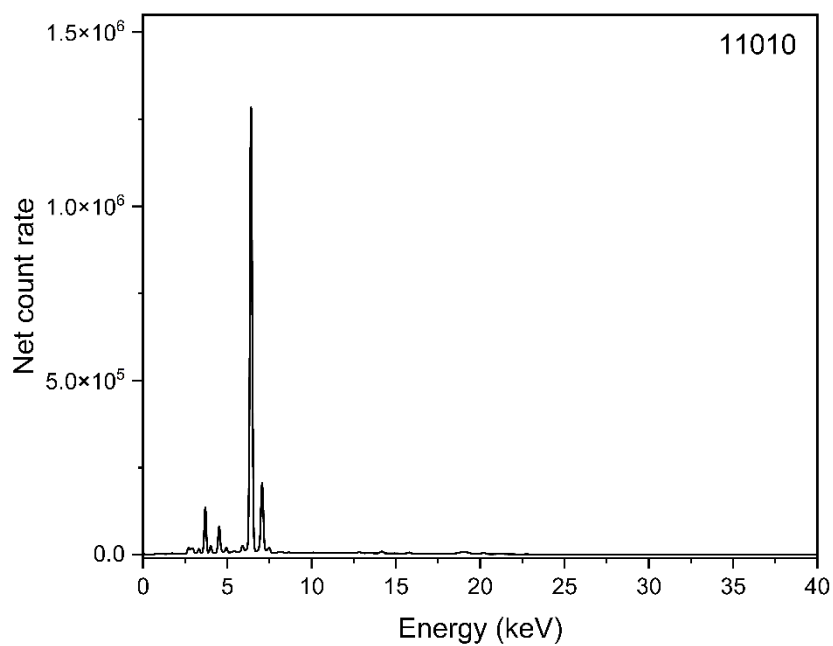
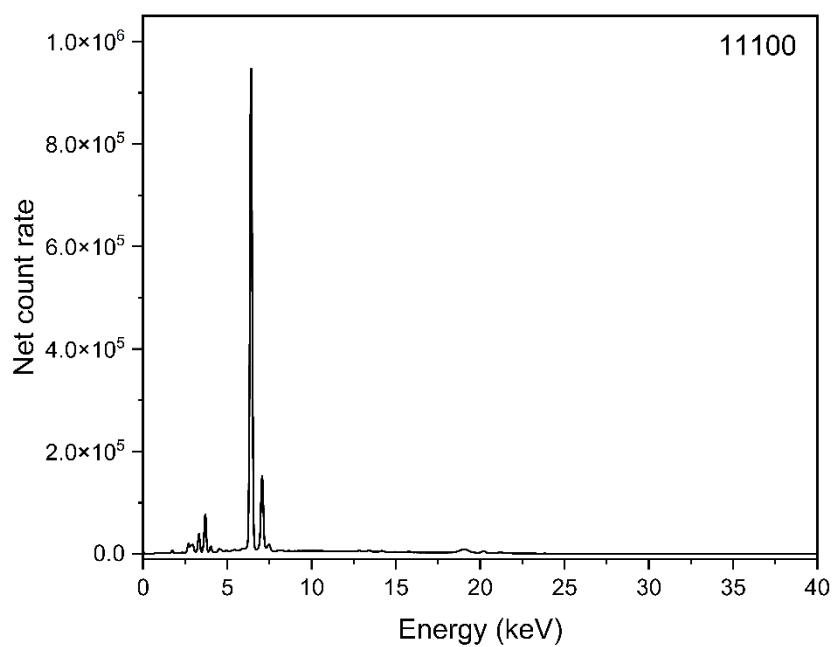


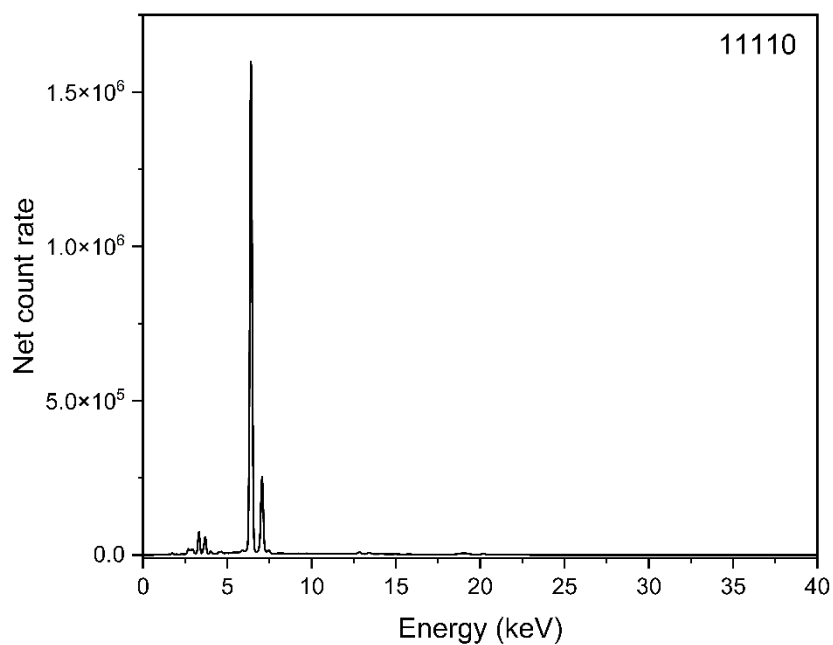




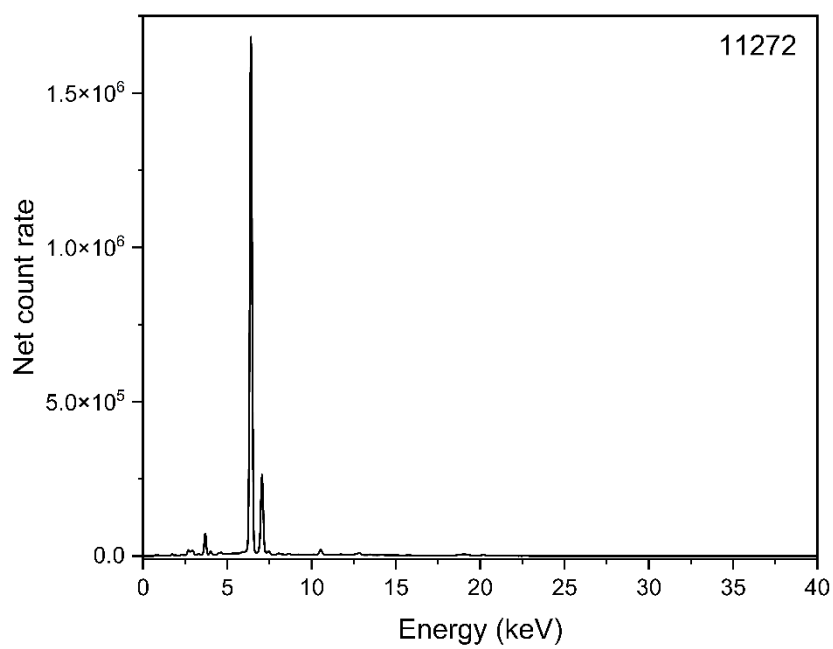




**Figure S2.** Raw XRF data (full data set)*XRF spectrum of pigment PK-11010**XRF spectrum of pigment PK-11100*

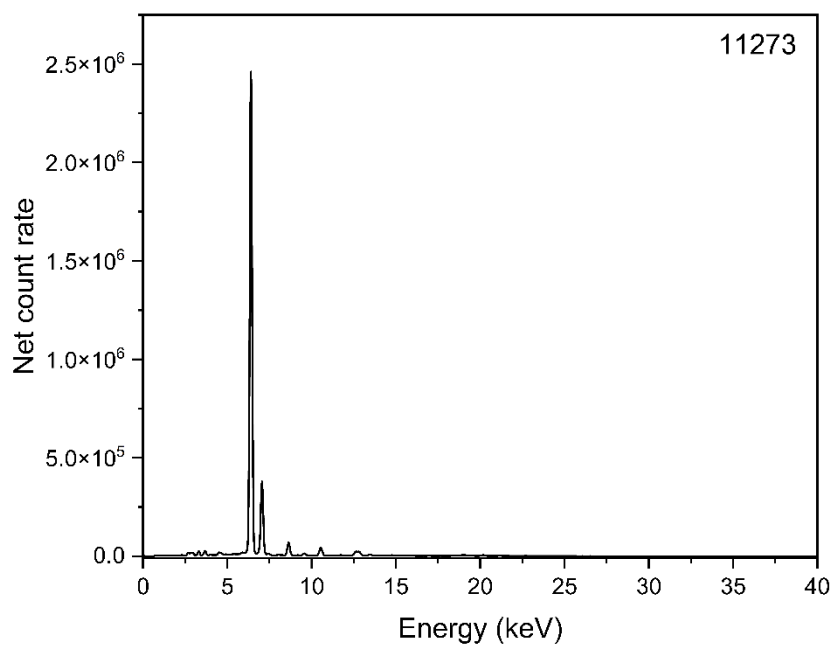


*XRF spectrum of pigment PK-11110*

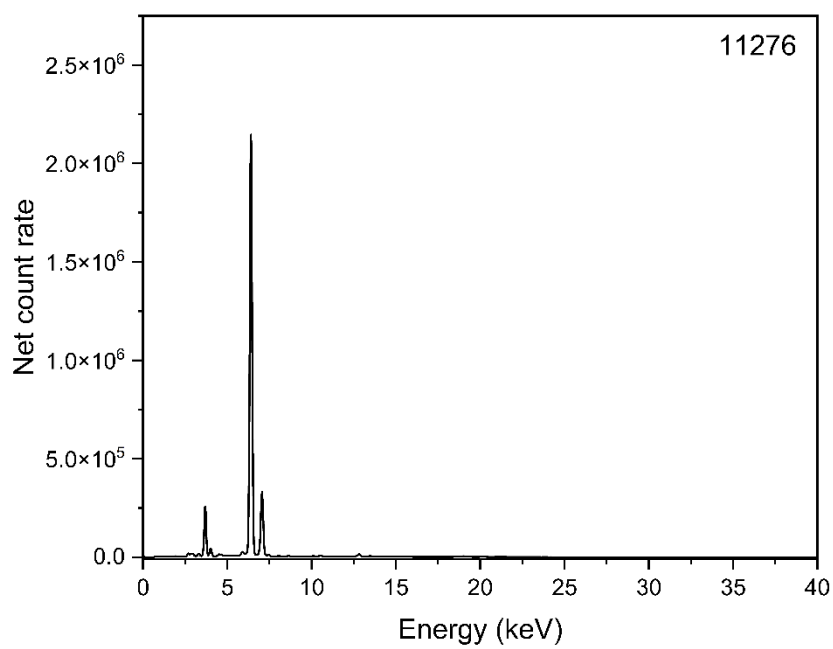


*XRF spectrum of pigment PK-11272*

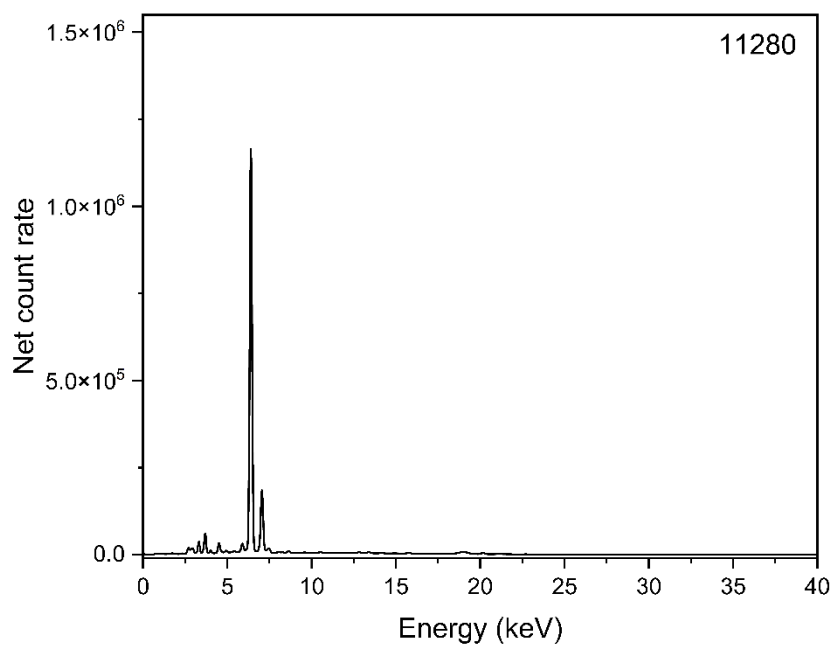




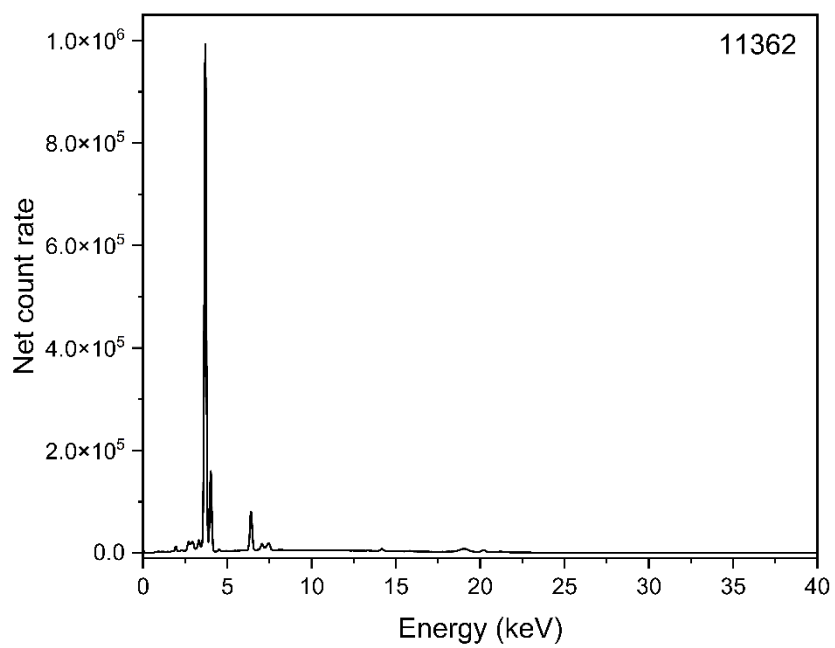
*XRF spectrum of pigment PK-11273*



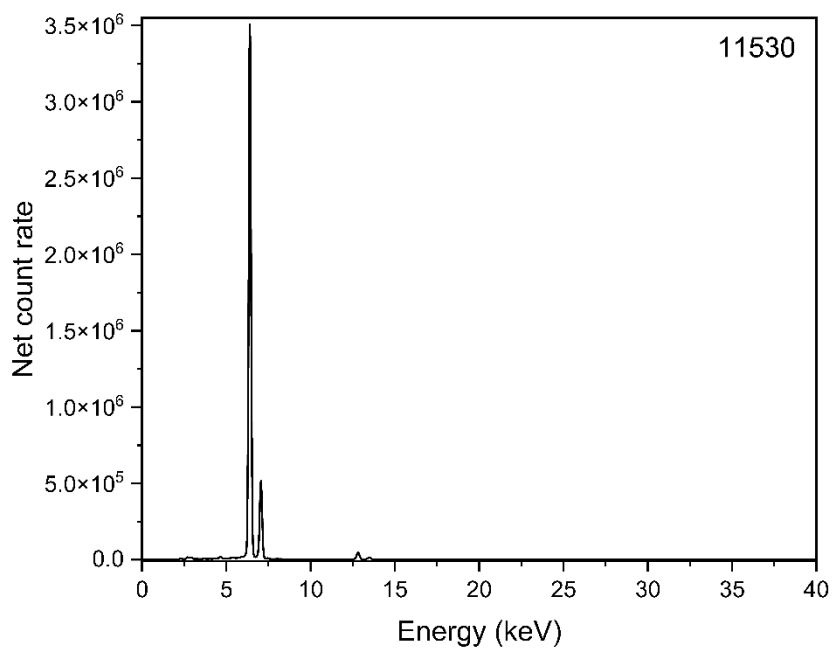
*XRF spectrum of pigment PK-11276*



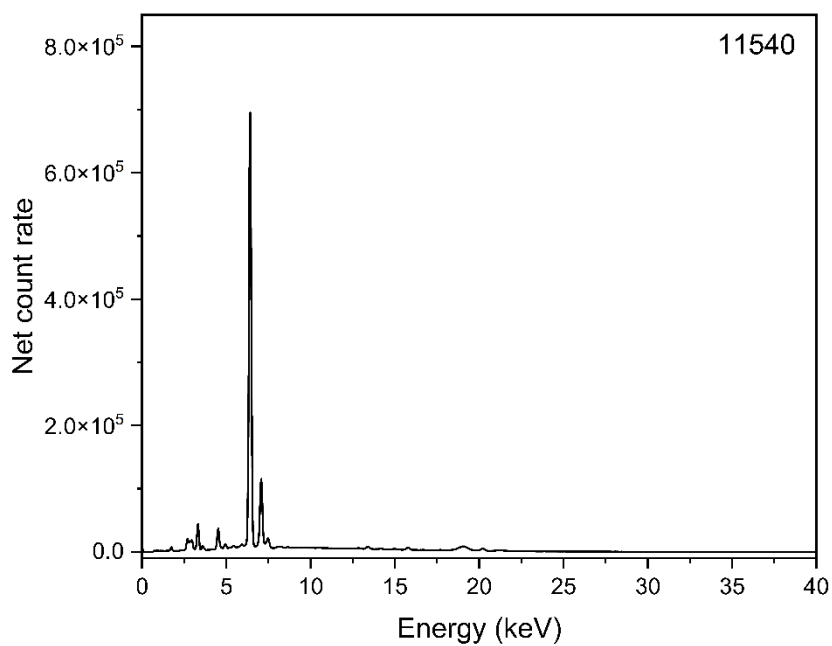
*XRF spectrum of pigment PK-11280*



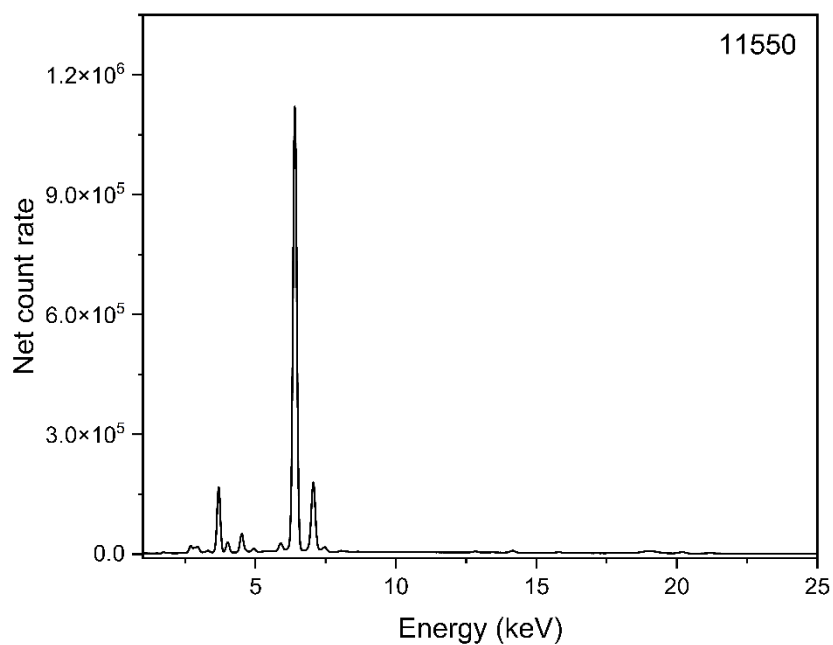
*XRF spectrum of pigment PK-11362*



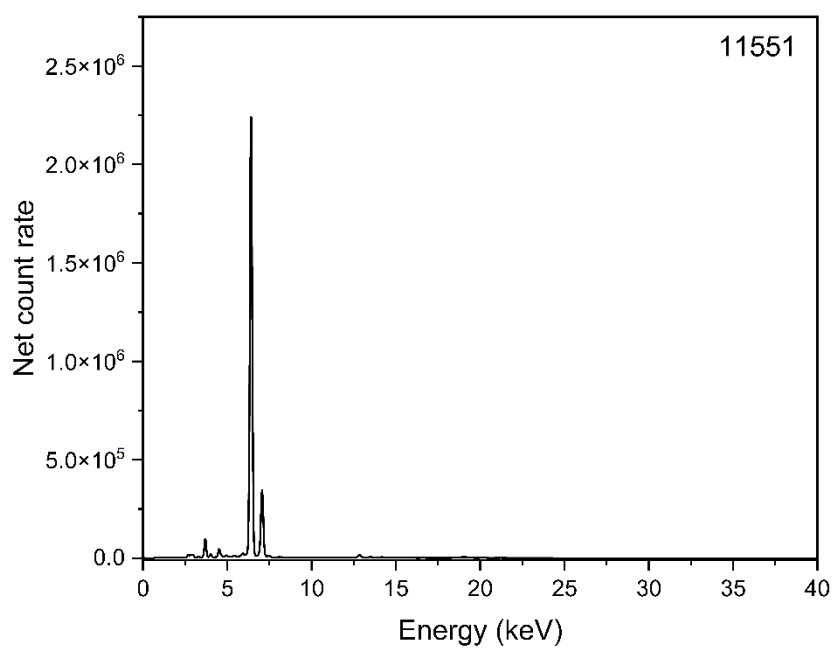
*XRF spectrum of pigment PK-11530*



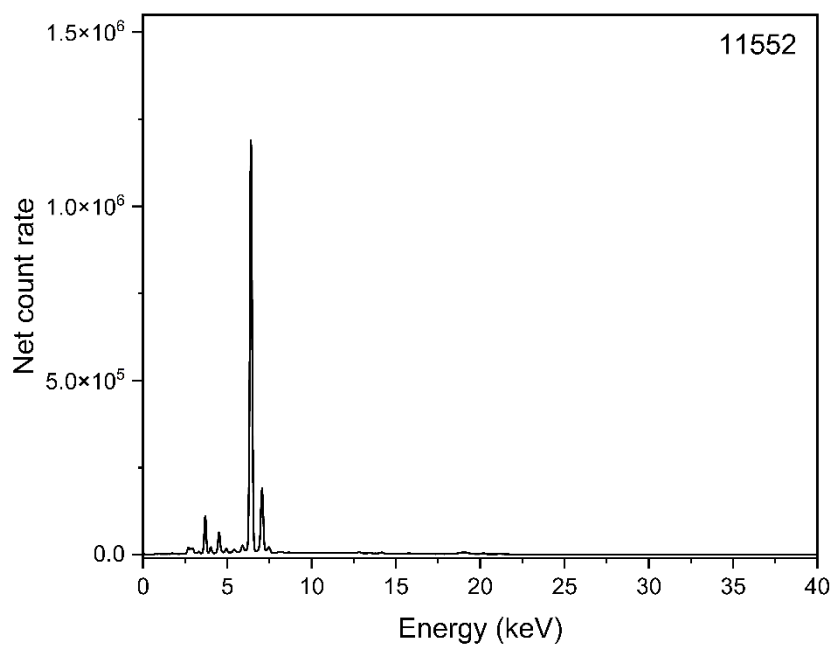
*XRF spectrum of pigment PK-11540*



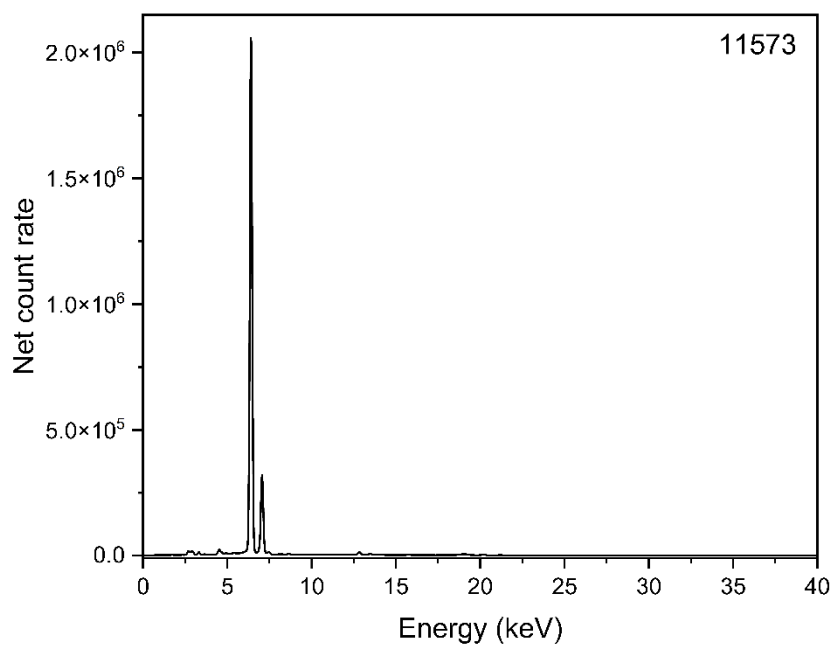
*XRF spectrum of pigment PK-11550*



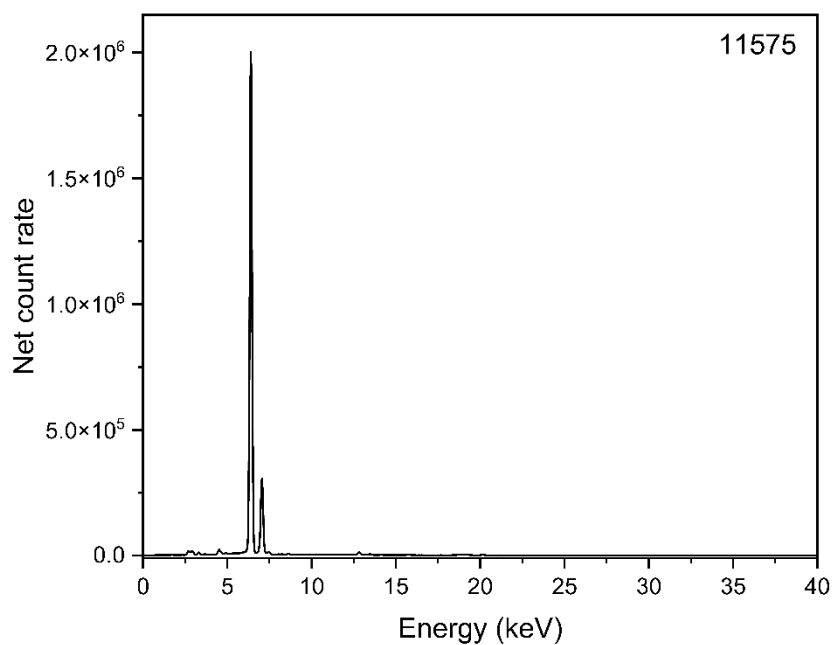
*XRF spectrum of pigment PK-11551*



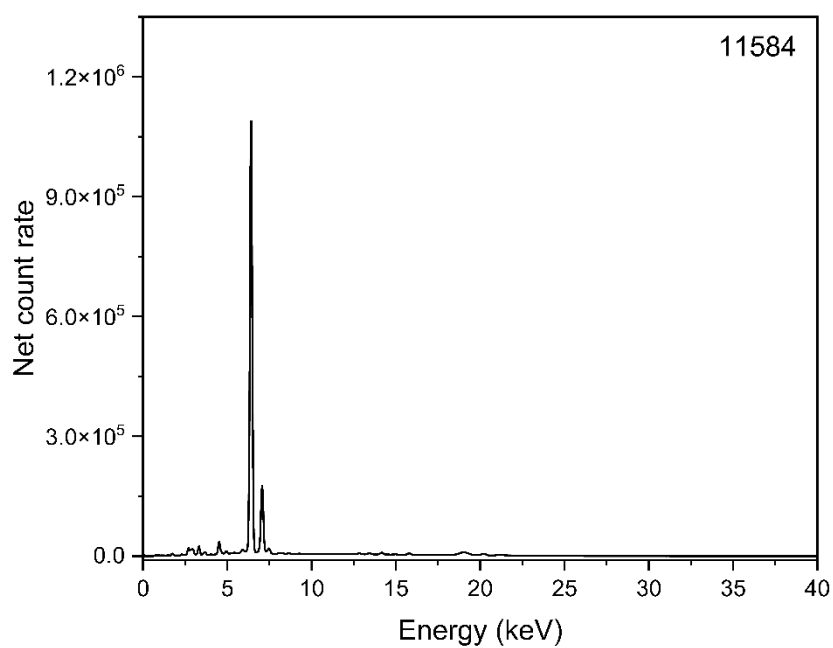
*XRF spectrum of pigment PK-11552*



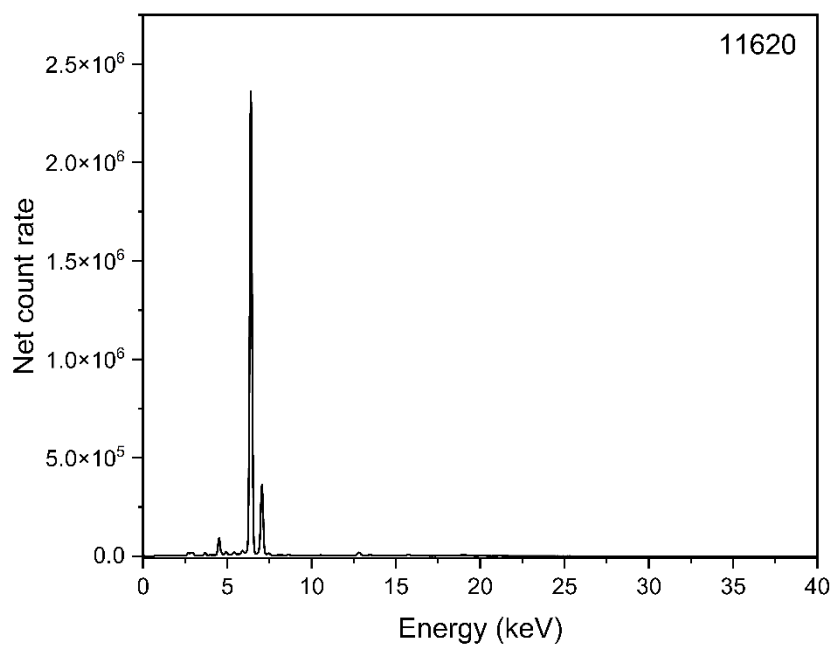
*XRF spectrum of pigment PK-11573*



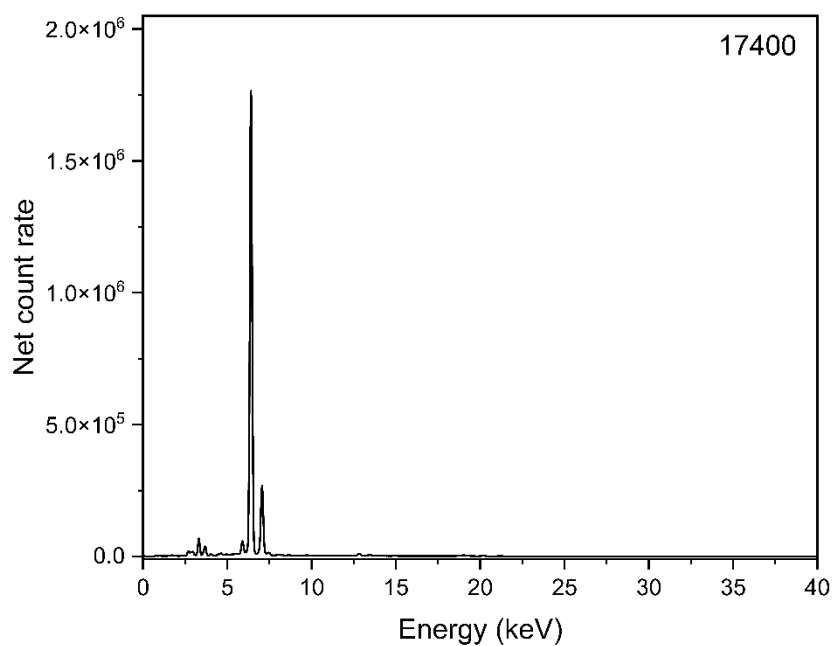
*XRF spectrum of pigment PK-11575*



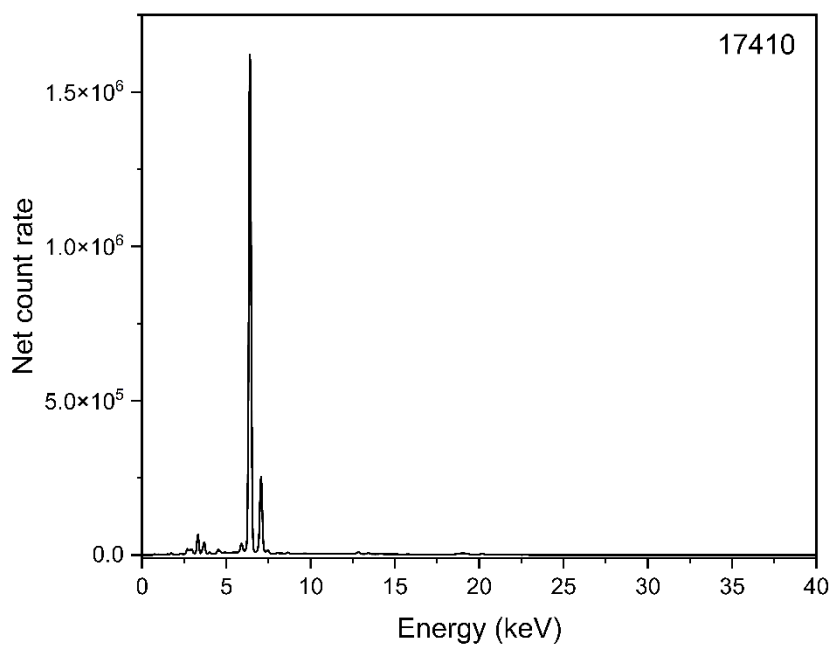
*XRF spectrum of pigment PK-11584*



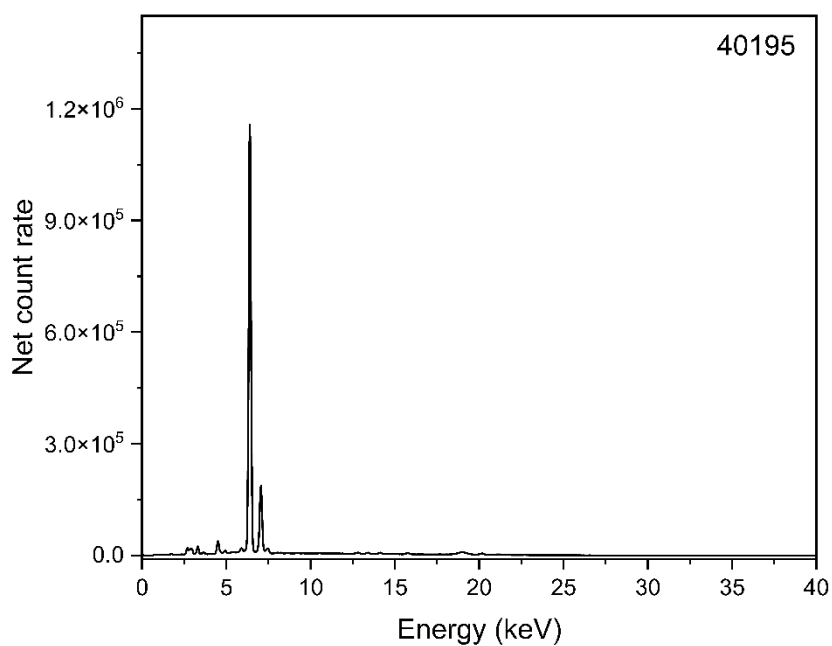
*XRF spectrum of pigment PK-11620*



*XRF spectrum of pigment PK-17400*

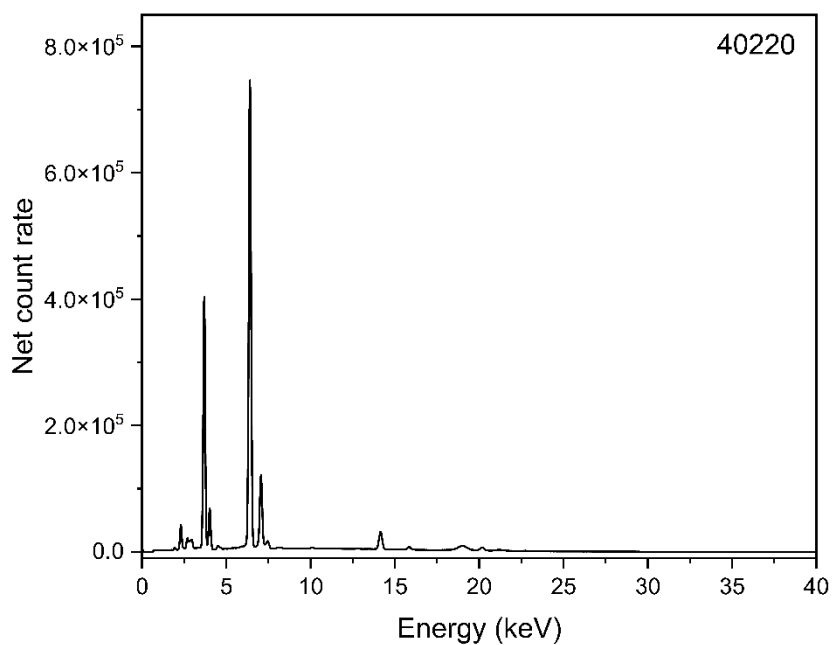


*XRF spectrum of pigment PK-17410*

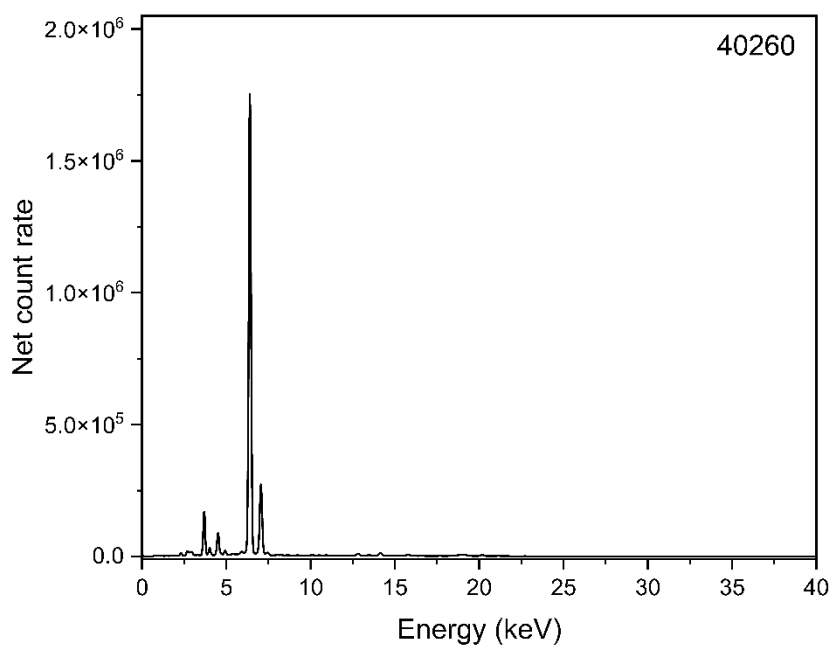


*XRF spectrum of pigment PK-40195*

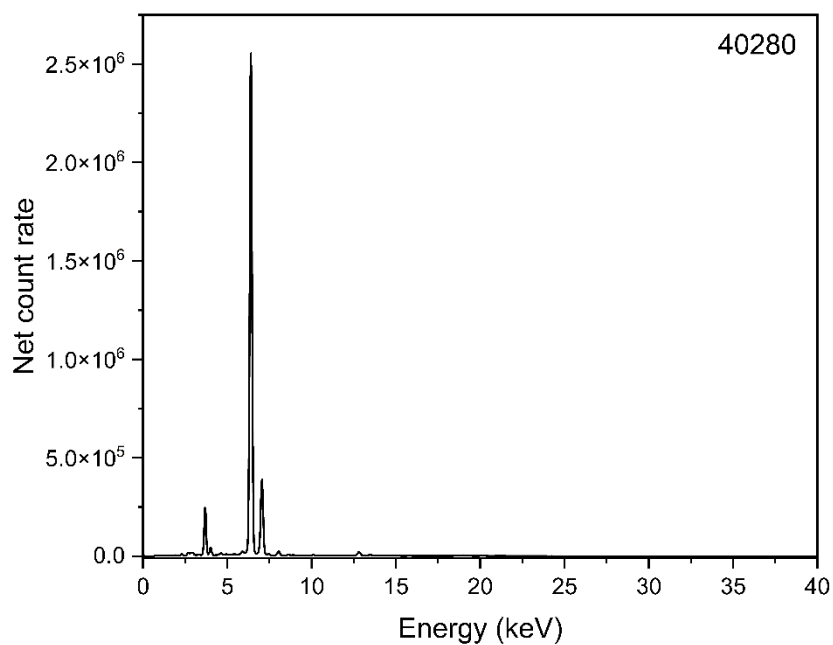




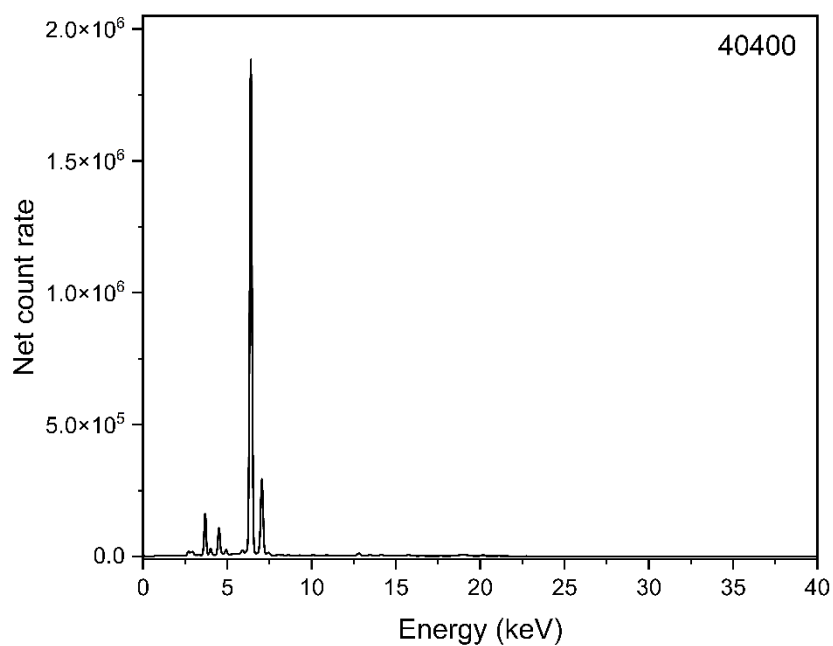
*XRF spectrum of pigment PK-40220*



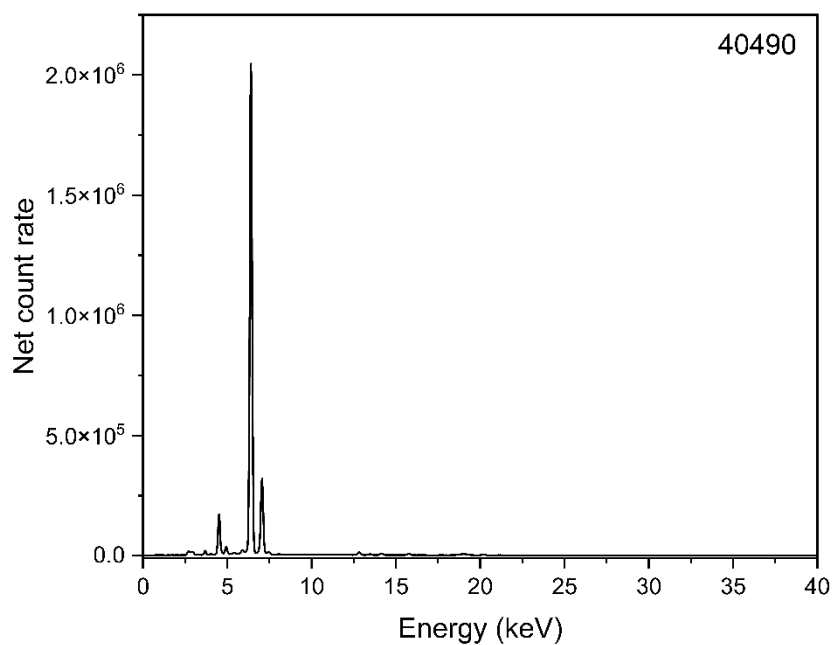
*XRF spectrum of pigment PK-40260*



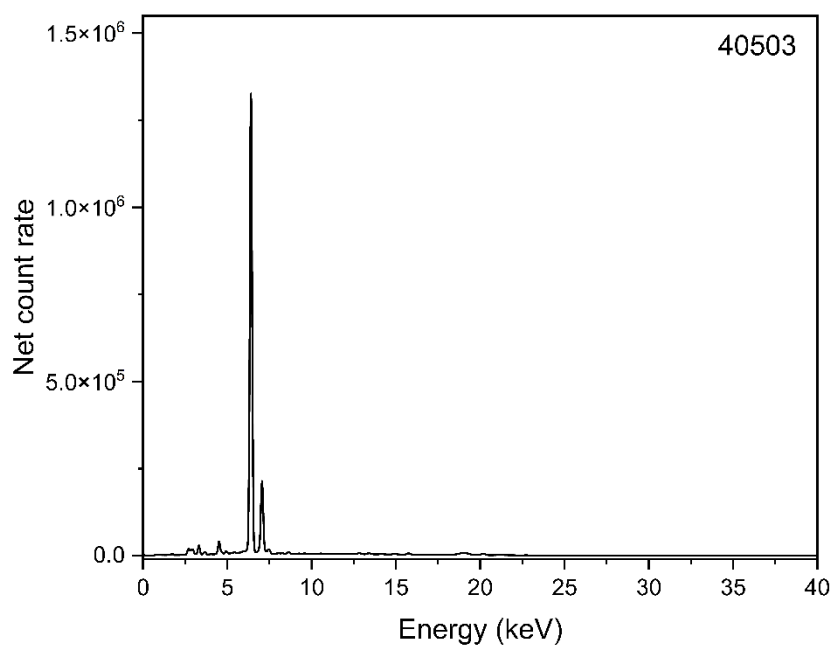
*XRF spectrum of pigment PK-40280*



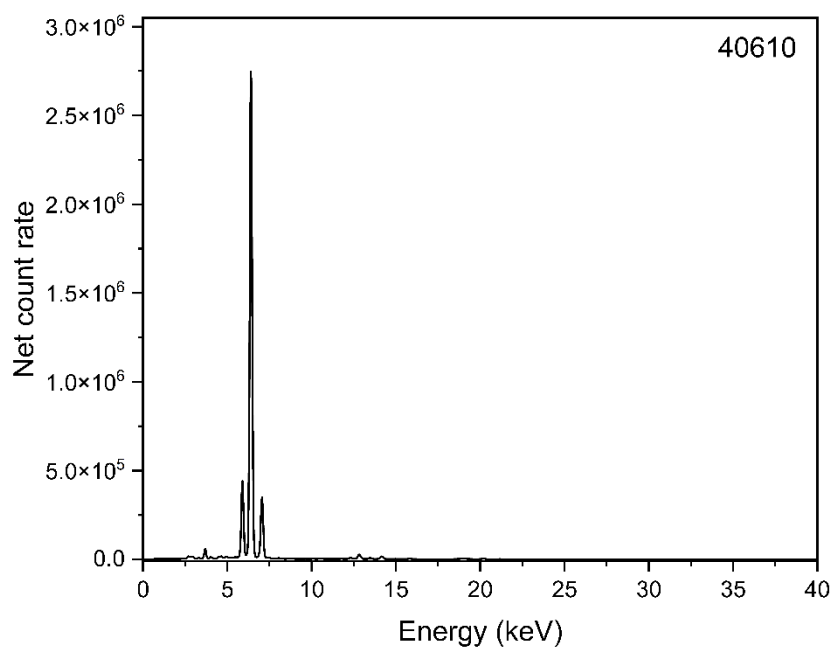
*XRF spectrum of pigment PK-40400*



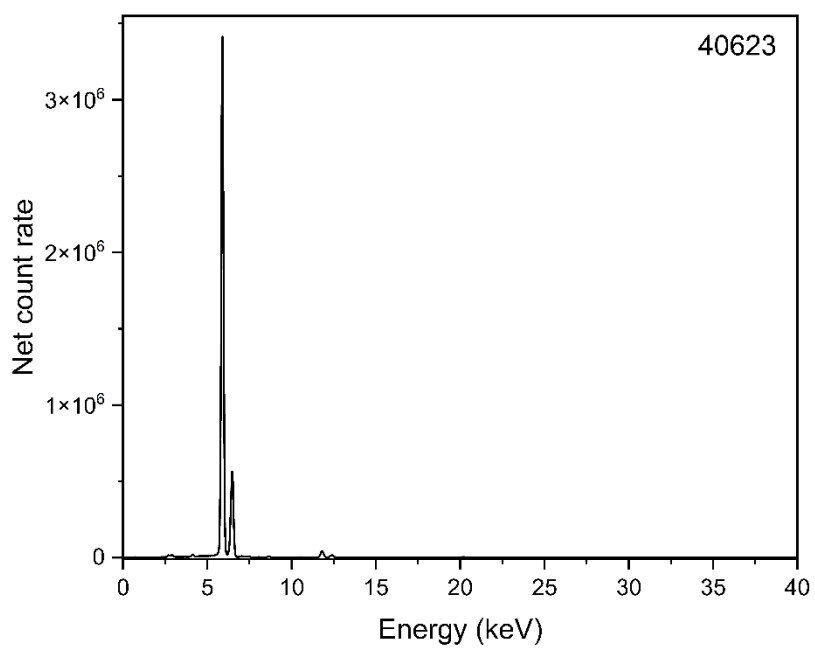
*XRF spectrum of pigment PK-40490*



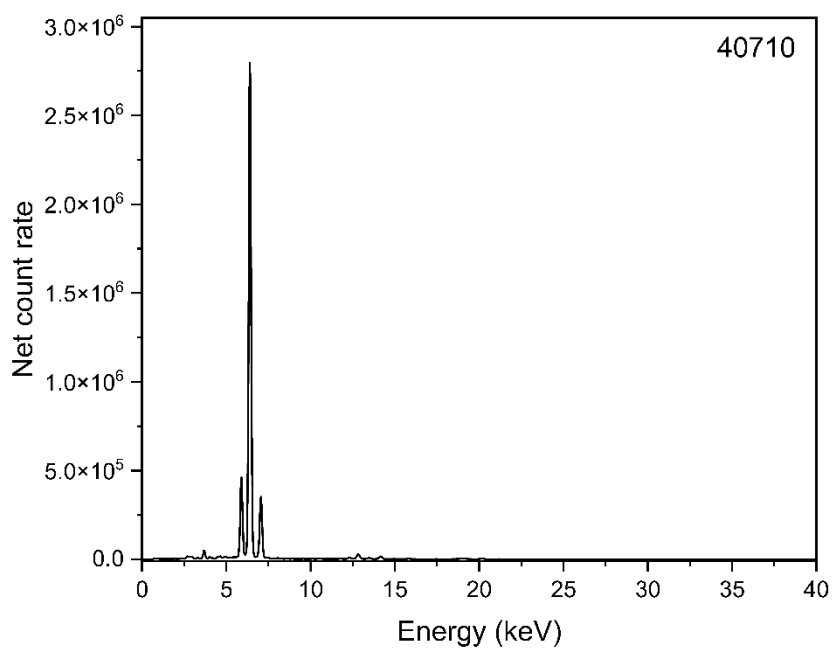
*XRF spectrum of pigment PK-40503*



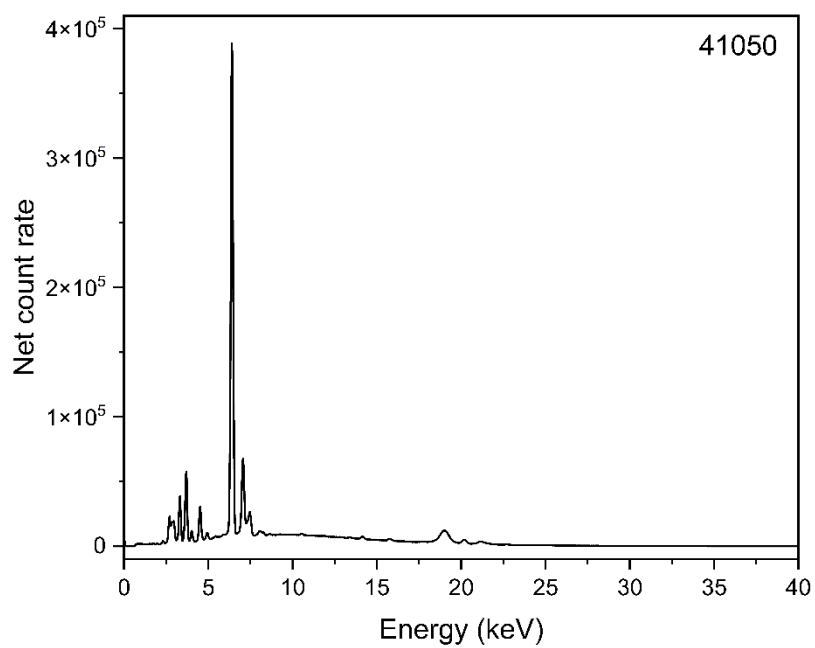
*XRF spectrum of pigment PK-40610*



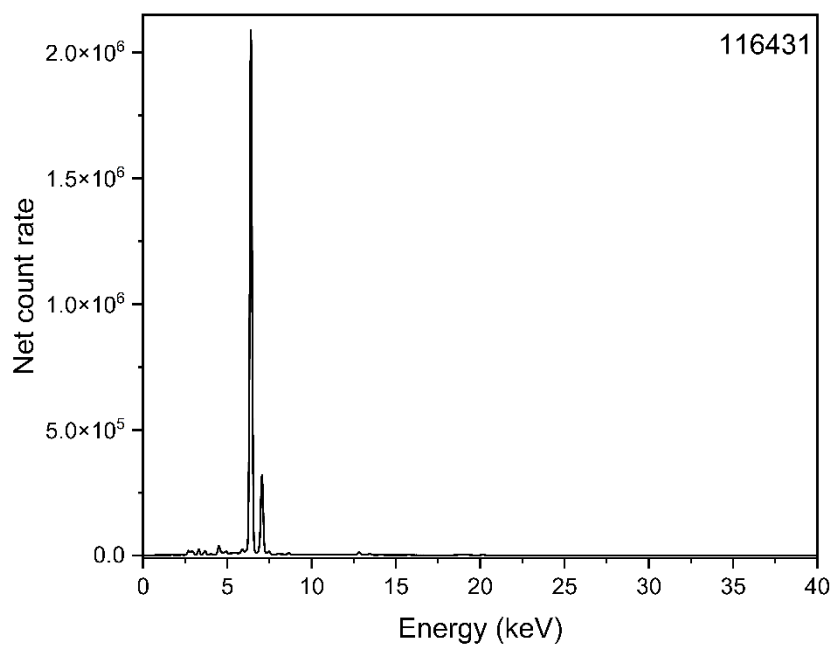
*XRF spectrum of pigment PK-40623*



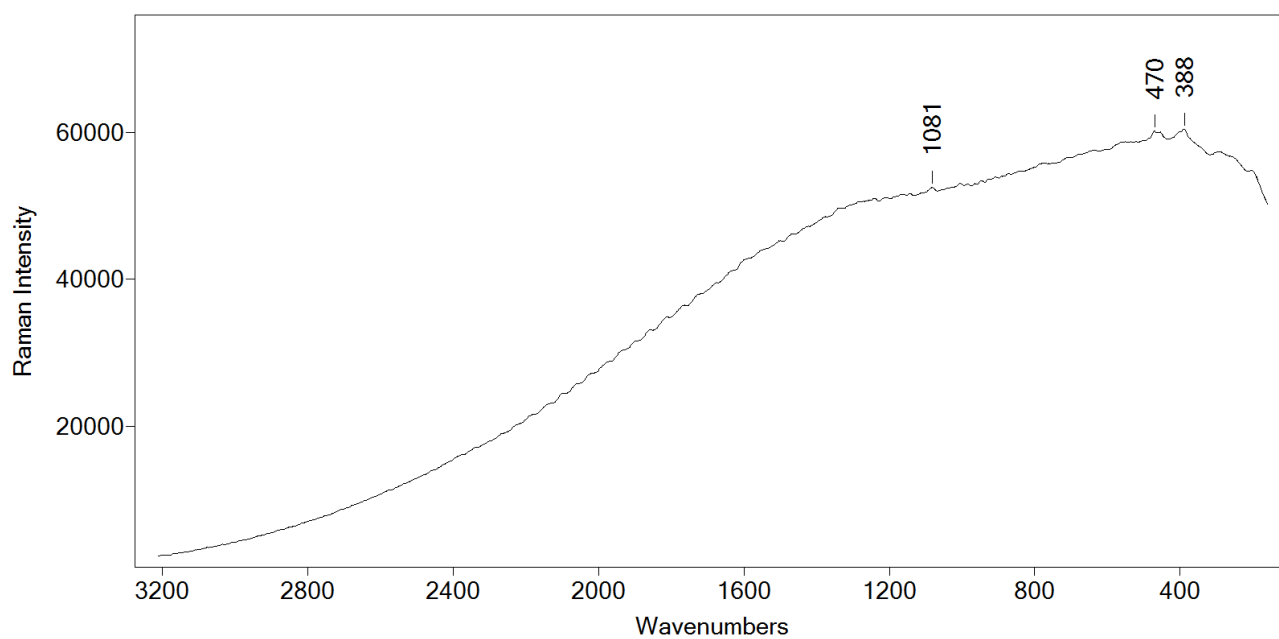
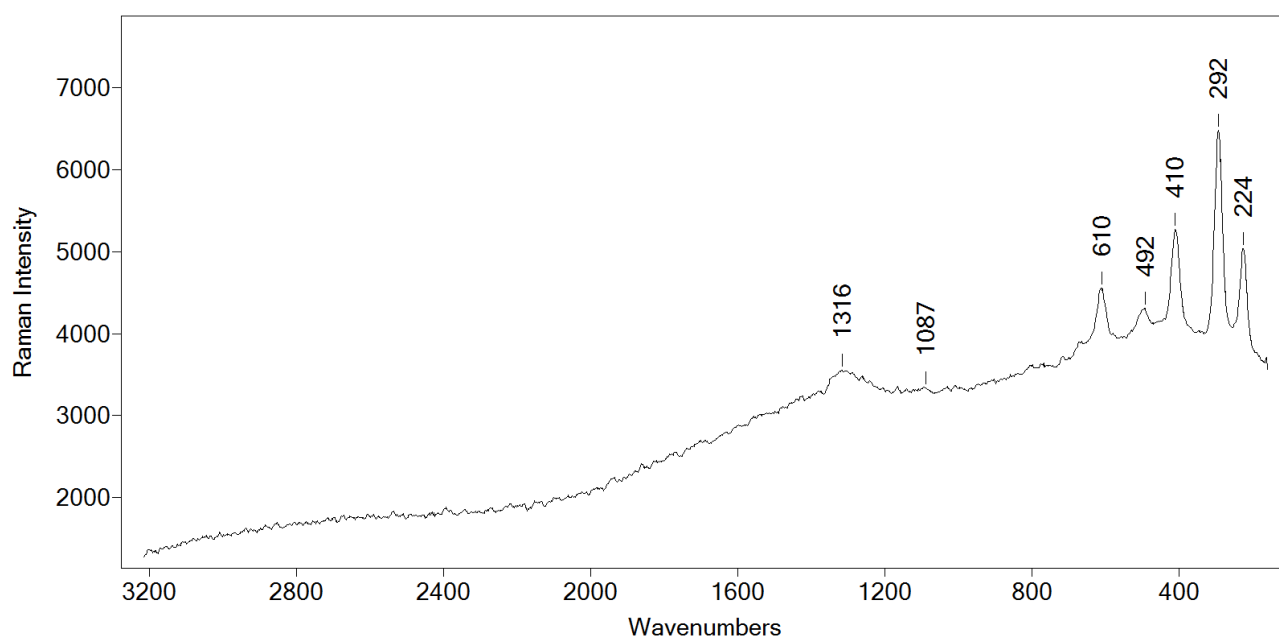
*XRF spectrum of pigment PK-40710*

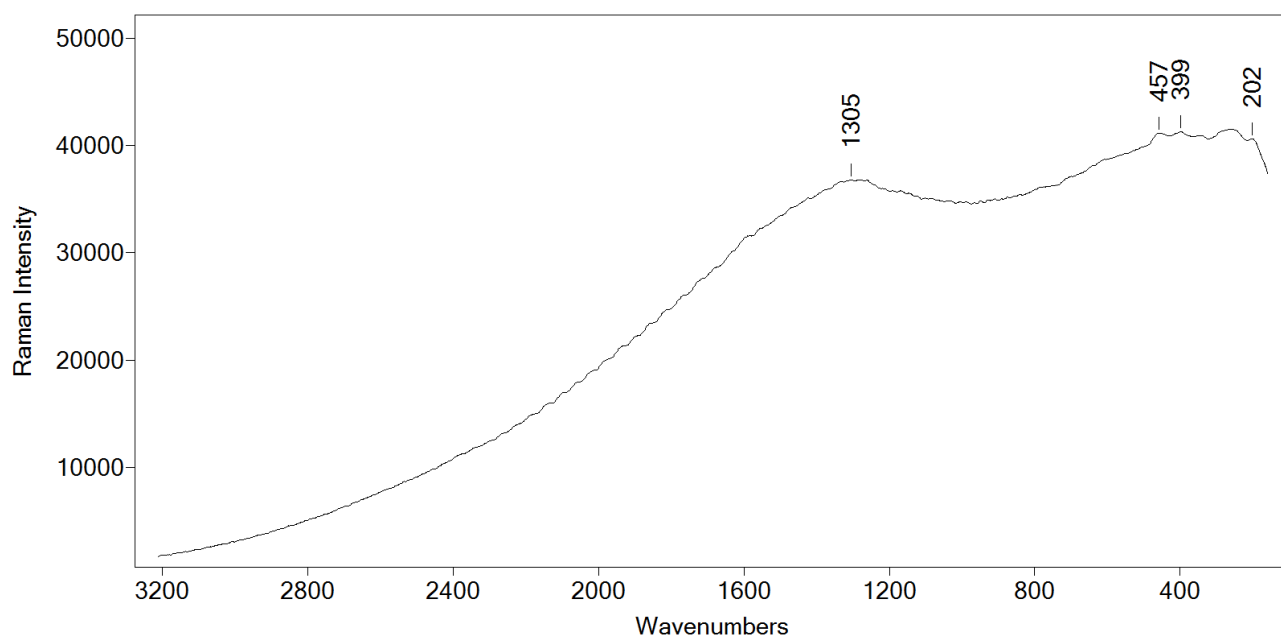


*XRF spectrum of pigment PK-41050*

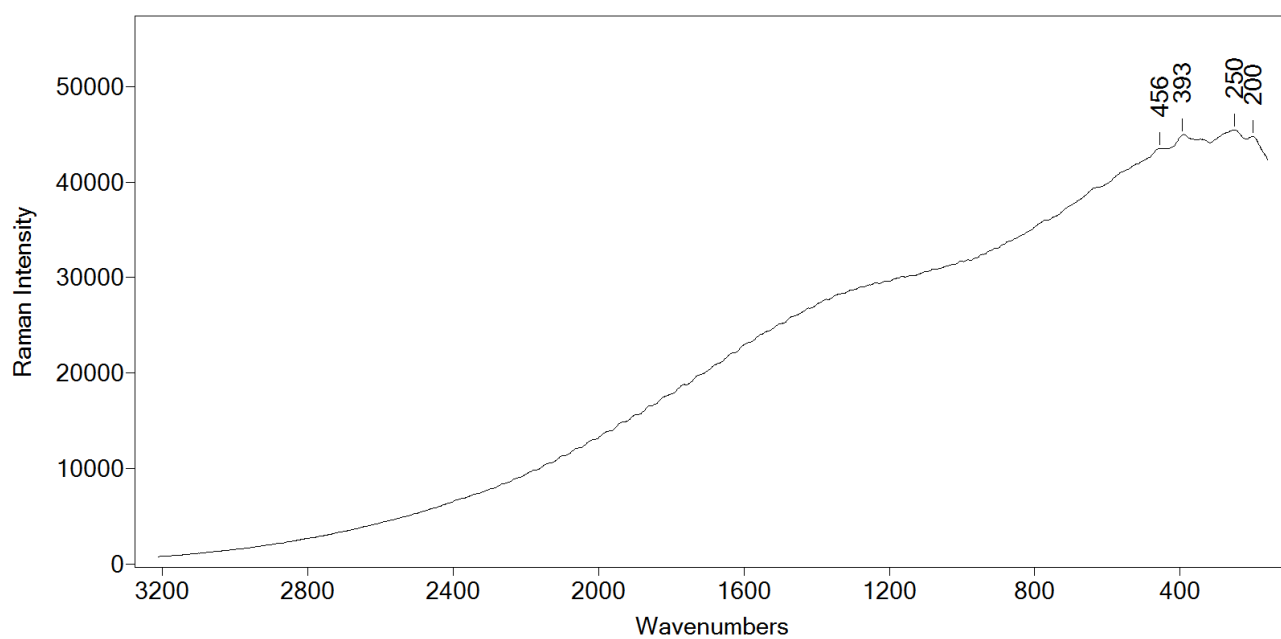


*XRF spectrum of pigment PK-116431*

**Figure S3. Raw Raman data (785 nm)***Raman spectrum of pigment PK-11272**Raman spectrum of pigment PK-11273*

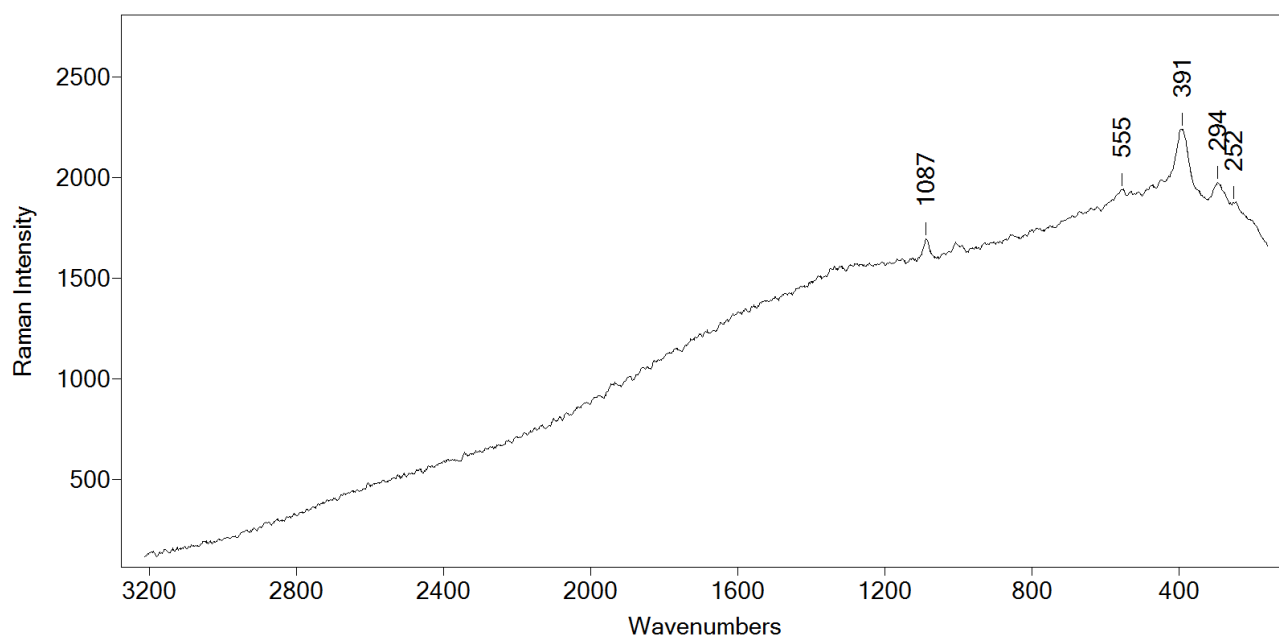


*Raman spectrum of pigment PK-11540*

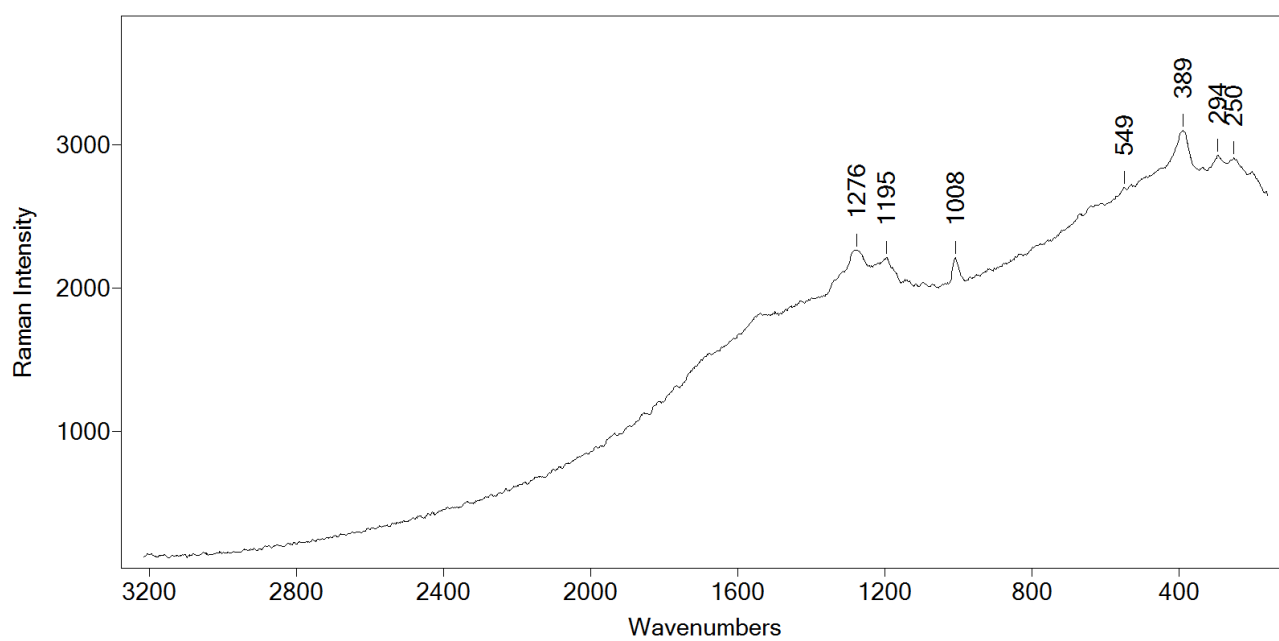


*Raman spectrum of pigment PK-11573*

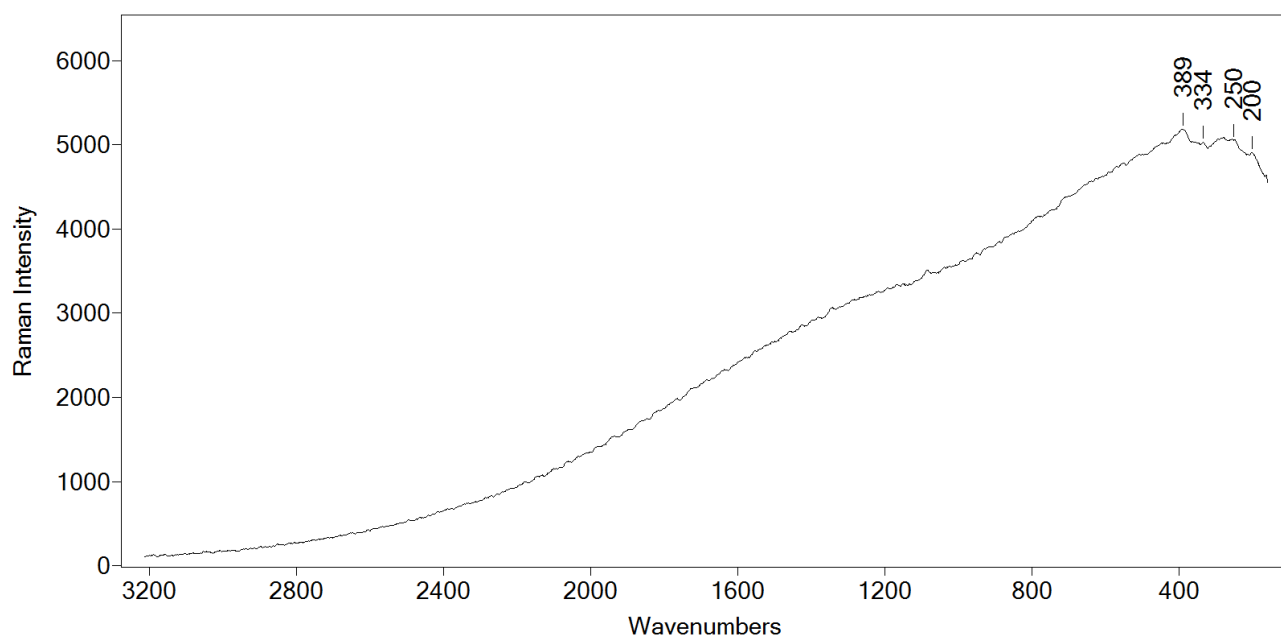




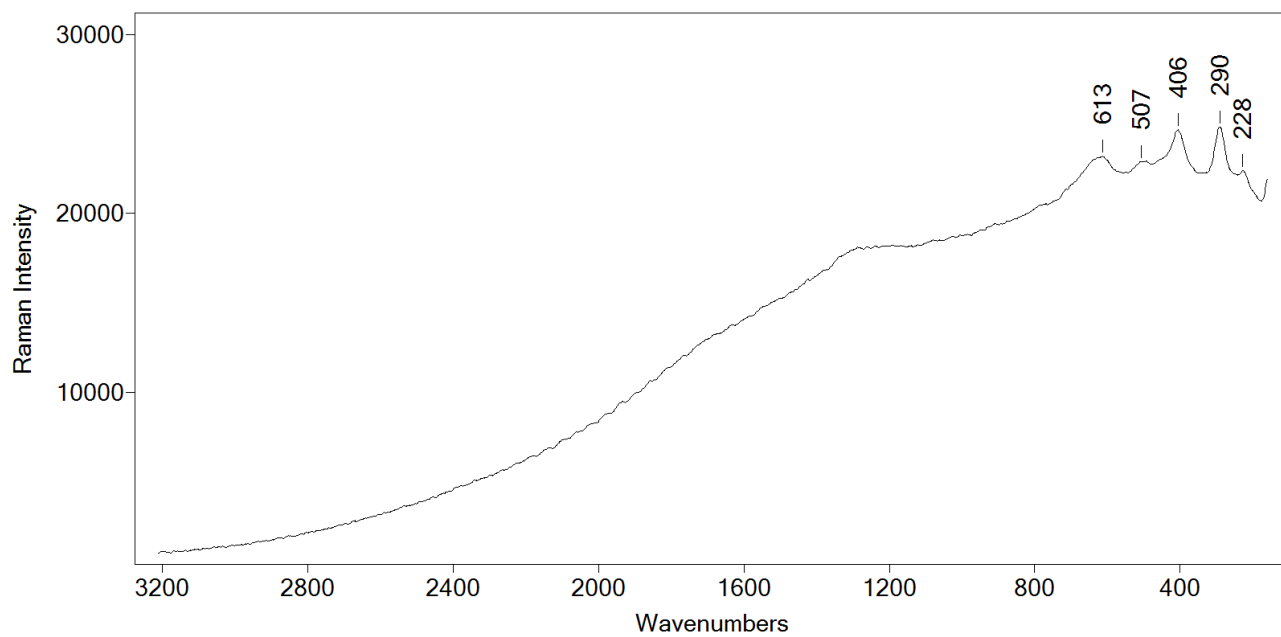
*Raman spectrum of pigment PK-40280*



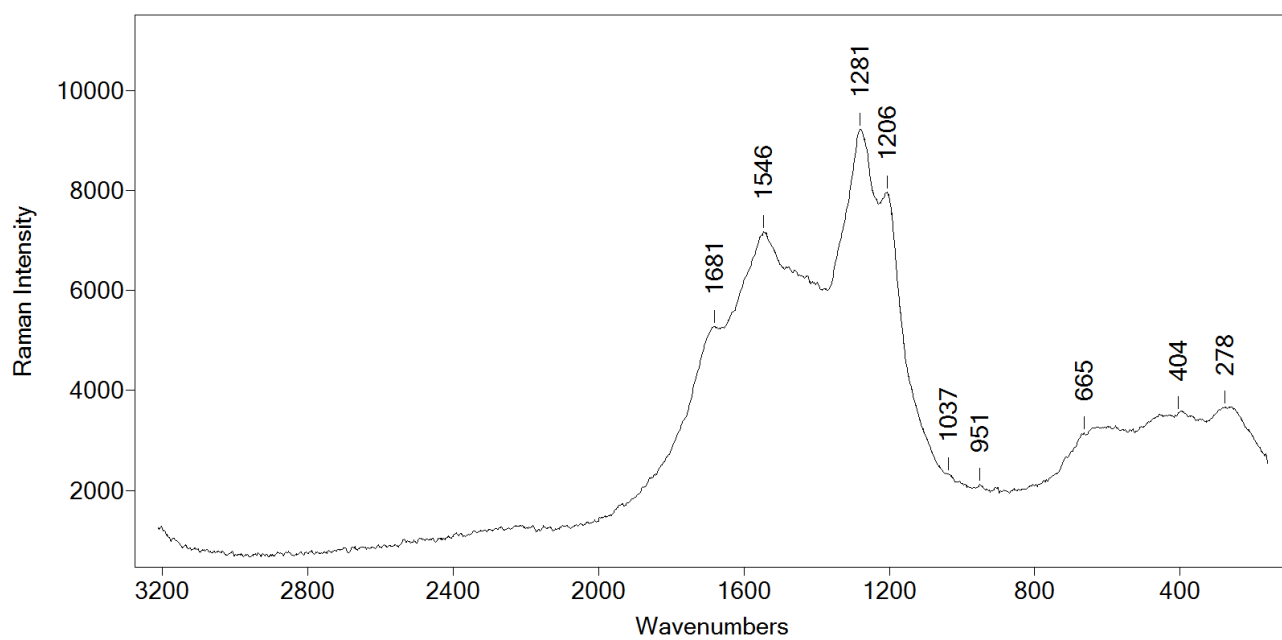
*Raman spectrum of pigment PK-40260*



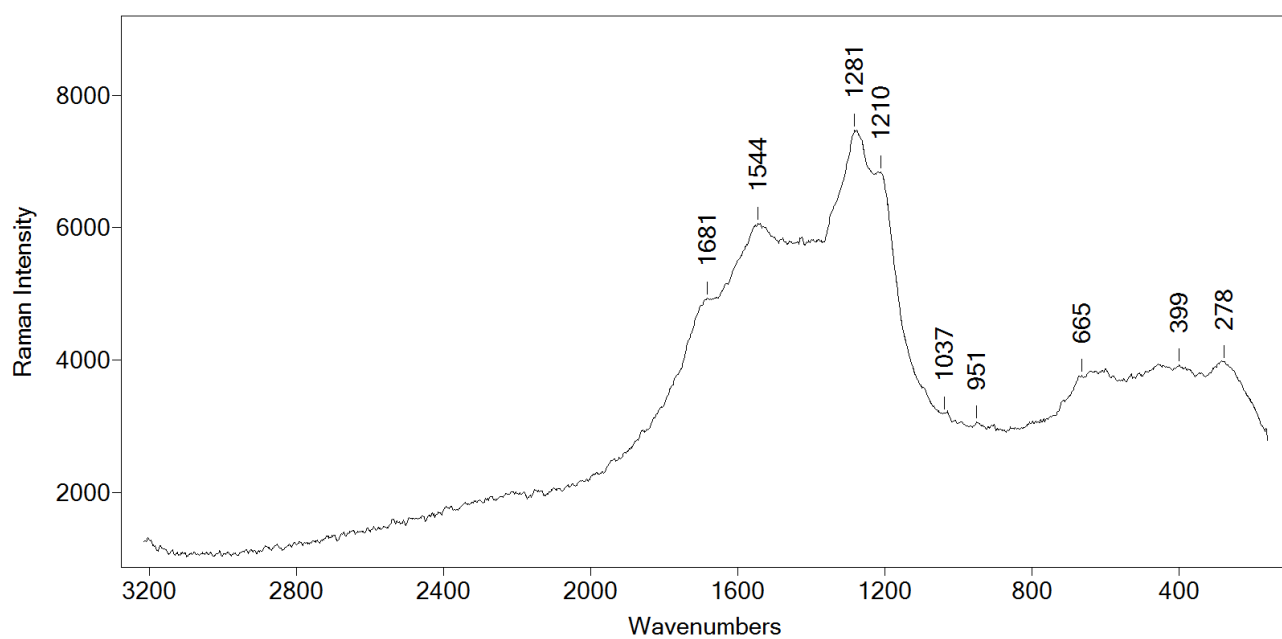
*Raman spectrum of pigment PK-40400*



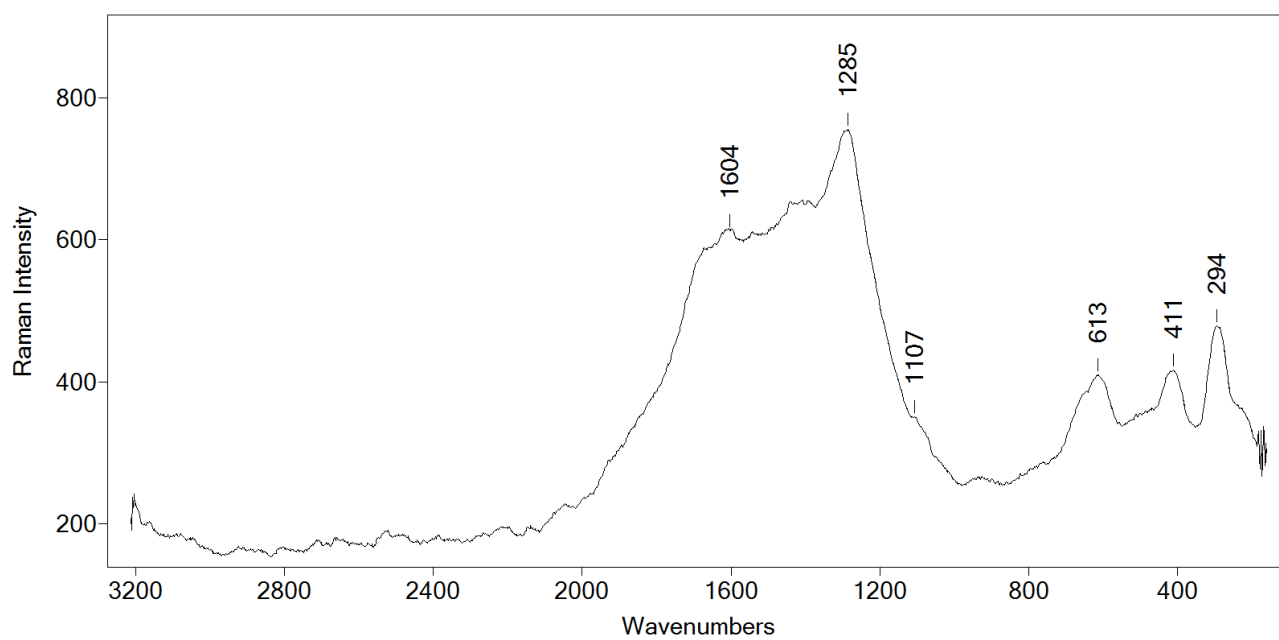
*Raman spectrum of pigment PK-40490*



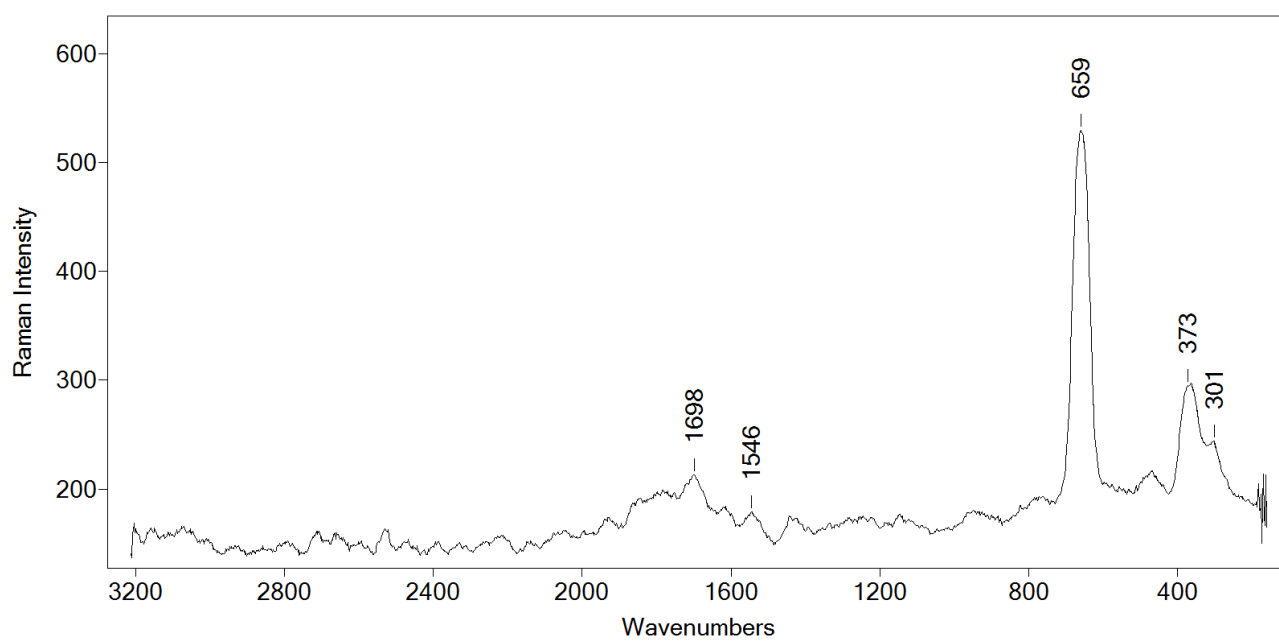
*Raman spectrum of pigment PK-40610*



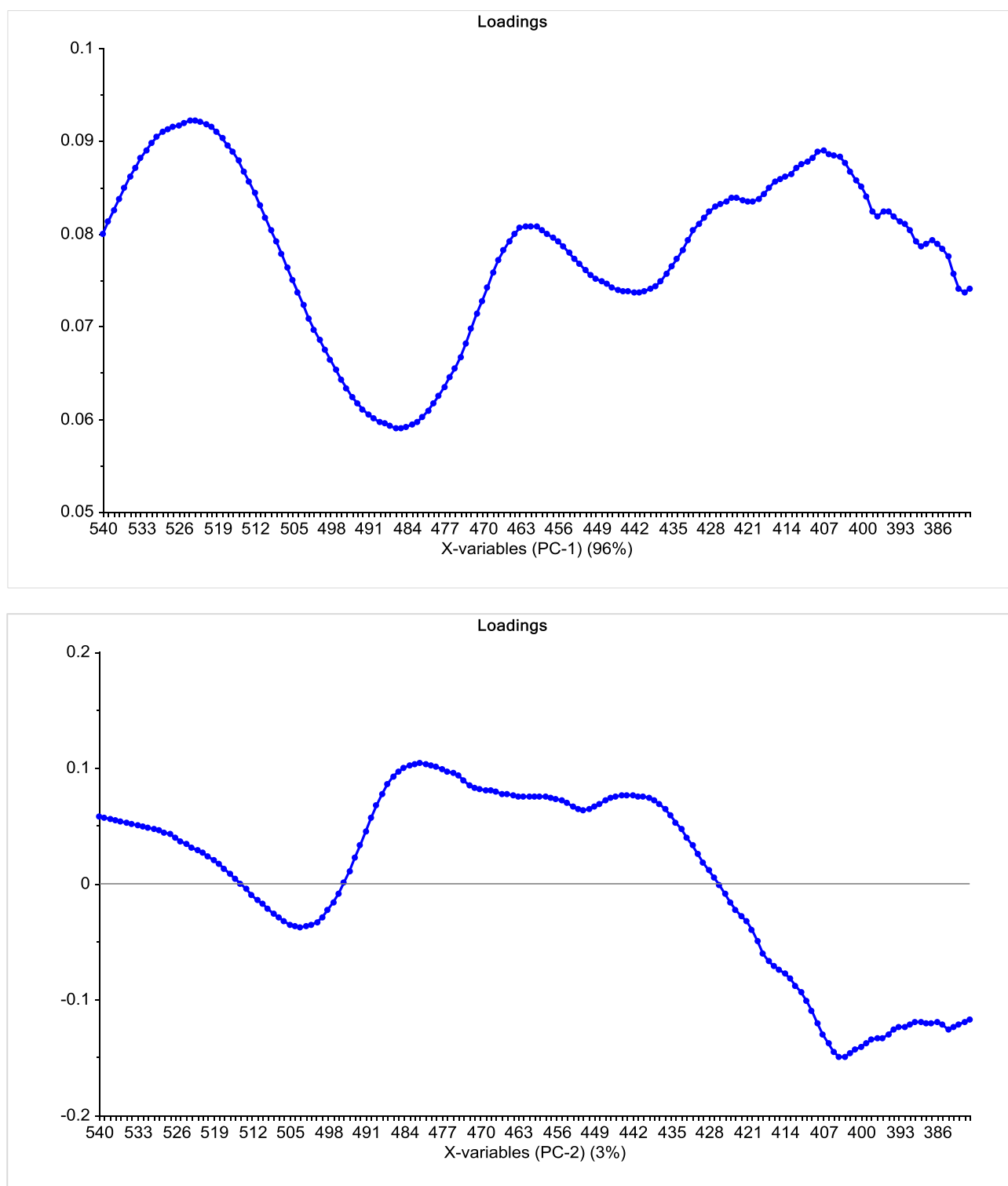
*Raman spectrum of pigment PK-40710*



*Raman spectrum of pigment PK-11550*



*Raman spectrum of pigment PK-40623*

**Figure S4. Loading plots (FTIR-PCA)**

*Loading plots of PC1 and PC2 of the PCA performed on the IR region between 540-380  $\text{cm}^{-1}$  of the red ochre pigments studied (characteristic absorption region for hematite)*