

Global Description for Global Science Value Chemical Composition

Priority Level 1: Science Value Chemical Composition (L1) (Vicky's comments in blue.)

Science value of chemical composition (L1 %) will be calculated from the following equation:

$$L1 = (X + Y + Z / L1_{\text{max.points}}) * 100$$

where X is the total score of Organics & Volatiles feature, Y is scores of Organic/Silicate ratio, and Z is scores of CH₂/CH₃ ratio and maximum points of L1 (L1_{max.points}) is 9.

X is the total score of Organics & Volatiles feature that will be calculated from the following equation:

$$X = a + b + c$$

where a is the total score of organic features,

b is the detection of adsorbed molecules, when it is detected b = 1, when it is under detection limit (featureless) then b = 0,

c is the detection of Adsorbed H₂O, when it is detected c = 1, when it is under detection limit (featureless) then c = 0.

a is the total score of Organic features that will be calculated from the following equation:

$$a = i + j + k$$

where i is the detection of aliphatic hydrocarbon feature, when it is detected i = 1, when it is under detection limit i = 0,

j is the detection of polycyclic aromatic hydrocarbon (PAHs) feature, when it is detected j = 1, when it is under detection limit j = 0,

k is the detection of unknown spectral features (neither aliphatic hydrocarbons nor PAHs) but noteworthy possible organic spectra. When such a feature is detected k = 1, when not, k = 0.

Y is the score calculated from the Organics/Silicate (O/S) ratios compared to the O/S ratios from the best representative lab data of primitive astromaterials. Y will be considered only when any organic feature is detected (when a > 1). (Calculating the ratio of organics to silicates requires having the abundances of both, but organics will likely be characterized dominantly by OVIRS and we won't have abundance information. I'm happy to think about creative ways we might go about calculating something like this, but it might require some additional effort.)

Y = either d or e or f (when a > 1)

When a > 1 and the O/S is similar to the O/S of average carbonaceous chondrite, then

$$Y = d = 1$$

When a > 1 and the O/S is similar to the O/S of CM2 carbonaceous chondrite, then

$$Y = e = 2$$

When a > 1 and the O/S is similar to the O/S of IDPs, then

$$Y = f = 3$$

Z is the score calculated from the CH₂/CH₃ ratio in aliphatic hydrocarbon compared to the ratios from the best representative lab data of primitive astromaterials. Z will be considered only when aliphatic hydrocarbon feature is detected (when i = 1). (Similarly, we may not have the ability to calculate this ratio.)

Z = either d or e or f (when a > 1)

When i = 1 and the CH₂/CH₃ ratio is similar to the ratio of CM2 carbonaceous chondrite, then

$$Z = g = 1$$

When i = 1 and the CH₂/CH₃ ratio is similar to the ratio of IDPs, then

$$Z = h = 2$$

