Gammaray API unit conversion

Often, in borehole logging applications, people need the output of the measurement in "Gammaray API's" (the API is the American Petroleum Institute and the unit is based on their calibration borehole in Houston, Texas). There are many theories on how to convert concentrations (in Bq/kg or in ppm) to the grAPI number. For instance, one definition says:

- **Gamma Ray (GR) response** for the mineral is estimated by taking the bulk activity calculation and correcting for absorption and density by comparing the gamma ray measurements derived from the geophysical log response (borehole geometry) from the American Petroleum Institute test facility in Houston, Texas. The \( \text{GRapi} = \text{Bq/}210 \times 2 \times (S \times \text{mole wt.}) \) where:
  - \( \text{GRapi} \) is gamma ray (in api units),
  - 210 is the empirical proportionality factor from Bq to GRapi units,
  - and \( S \) = mean atomic number of the mineral.

The problem here is of course that you need the average atomic mass of the mineral you are looking at.

Another straightforward conversion that is used often is the following:

- **Gamma[API]=19.6*K[\%]+8.1*U[ppm]+4.0*Th[ppm]**

Example of a gr API output