

Answer on Question#41223-Chemistry-Other

Question.

I HAVE A QUESTION ABOUT GAS CHROMATOGRAPHY-FID DETECTION LIMIT.HOW TO CONVERT DETECTION LIMIT Pg C/S TO PPM MOL HYDROCARBON? FOR EXAMPLE 2PgC/s. to ppm mol propane?

Answer:

The detector Minimum detectable level (MDL) value can be related to the minimum detectable sample concentration for a given chromatographic method. For mass flow detectors, the calculation is given by:

$$c_i = \frac{A}{Hv_e} MDL$$

Where:

c_i is the minimum sample concentration that can be detected for a given component.

A and H are the area and height of that component at some convenient sample concentration.

v_e is the volume injected corrected for split ratio if appropriate. MDL is the specified value.

For a Gaussian peak, A/H is approximately equal to the peak width measured at half height so that value can be used instead.

As an example, here is the calculation of minimum sample concentration for a peak that is expected to be 2 s wide (half height) on the FID. In this case, we need one additional piece of information and that is the relative amount of carbon in the compound of interest. If our compound is n-hexadecane (C16), for instance, it has 0.85 grams of carbon for every gram of C16. If the FID MDL is 2 pgC/s, then the MDL for C16 is (2/0.85) pg/s of C16 or 2.35 pg/s. Using these values and assuming a 1 μ L injection (no split), we have:

$$c_i = \frac{(2s) \left(2.35 \frac{pg}{s} \right)}{1 \mu L} = 4.7 \frac{pg}{\mu L} = 4.7 \frac{ng}{mL}$$