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EXPRESS Yourself!
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SO FAR, ...this year has brought forth some interesting conversations with non-scientists engaged in technical fields. These conversations have led to my realization that many people engaged in technical fields are hopelessly confused about the language in their selected area of practice, and don't actually understand many of the units of expression they banter about on a daily basis.

Here are three examples:

Nanograms/Liter

I was involved in an indoor air quality project wherein a bank had spent tens of THOUSANDS of dollars attempting to identify and correct a source of elevated VOCs in their building.

Two Certified Industrial Hygienists had performed sampling at the bank and sent the air samples to a respectable laboratory for analysis. The lab diligently reported its values in standard units of nanograms of analyte per liter of reported air (ng/l). The CIHs assumed that the units meant one nanogram per unit mass volume (such as water); and compounded that error by then erroneously presuming that 1 ng/l was equal to 0.001 micrograms/ml (0.001 ppm). In fact, both assumptions were grossly incorrect. One ng/l means that the laboratory found one nanogram (mass) of the analyte in question per one liter of air submitted. Since each of the analytes were gaseous volatile organic compounds one mole of each compound will occupy a specific volume of air depending on the altitude and the temperature (known as a molar volume). In order to express ng/l as "parts per million," one must convert the mass per unit volume to the molar volume it will

occupy and then divide by the molecular weight. The CIHs did not do that and none of the “ppm” values reported by the CIHs were actually ppm.

It turns out the bank never actually had a VOC problem, they had a CIH problem, and the tens of thousands of dollars spent on civil engineering schemes (French drains, and carbon traps and the like), were completely unnecessary.

CFUs/m³

A very common misconception of “Certified Microbial Consultants” and “Certified Mold Inspectors” and other untrained “mould experts” is that “Colony Forming Units per cubic meter of air” is a unit of *concentration*.

As of today, although I have met perhaps two hundred “certified” mould inspectors, I have never met a single “certified” mould inspector who could understand one of their laboratory reports. Without exception, every “certified” mould inspector I have met erroneously believed that “CFUs/m³” was an expression of *concentration*.

100% of the “certified” mould inspectors with whom I have spoken erroneously believed that if one had a sample of, say, 1,000 CFUs/m³, and another Sample with, say, 500 CFUs/m³ the sample with 1,000 CFUs/m³ represented twice as much mould in the sample than the one with 500 CFUs/m³.

When one explains to them that the sample with 500 CFUs/m³ may actually have three times more mould than the sample with 1,000 CFUs/m³ they will look at you with the same facial expression exhibited by the infant in the header of this post (I have no idea who owns the copyright, if there is one). Typically their face will remain like that for hours if you then explain to them that their Air-O-Cell sample that indicated 300 spores/m³ represents an atmosphere that is three times greater than their sample that was reported as 1,000 spores/m³. They are entirely ill equipped to get their head around the meaning of their “samples” (after all, they watch CSI on television and know all about laboratory analyses).

The fact remains, CFUs per cubic meter of air (or CFU/gram or whatever else one uses as the denominator) is a unit of convenience, and not a quantifiable unit of mould concentrations in the air. Those of you who may have been to some of my mould lectures, know that a quick way to earn little bottles of free scotch is to answer the trapdoor “why” questions.

Pico Curies per Liter

For those who may not know, the radon mitigation industry commonly uses a unit of expression “pCi/l” or “Pico Curies per Liter” when discussing radon. Again without exception, every person whom I have met who runs around “measuring radon” is under two seriously erroneous assumptions: 1) they are measuring radon and 2) the expression pCi/l is a unit of radon concentration. When you tell them neither is correct, you get the same look as the “certified mold inspector” (and undoubtedly the same expression that was on the face of the CIHs who read my report on the “bank job”).



Queer looks notwithstanding, a Curie (Ci) is an archaic unit of activity that has been long replaced with a Becquerel (Bq); personally, I still like the Ci. In any event, since a Ci is such a big thing, (3.7×10^{10} disintegrations per second) one needs to use a diminutive reduction factor, thus the “pico” prefix. One Bq is one disintegration per second, and therefore, one Bq equals 2.7×10^{-11} Ci. However, it still remains a unit of activity and not concentration. The radon guy, like the “certified” mould guy is surprised to learn that his “result” of, say, 10 pCi/l could have come from an atmosphere of anywhere from about 20 atoms of radon per liter of air to 200 atoms of radon per liter of air. When he learns that he never actually measured radon at all, then “surprise” is inadequate, and he is forced to resort to astonishment and defensive incredulity.

In my own neck of the woods, literally, we have a group of people who sell fire wood by the “cord.” Someday, I will share my experience of the arguments I have had with dishonest wood merchants who seem to think that a “cord of wood” is a personal choice that changes with the wind.

In the mean time – my cautionary tale is this: When one decides to be an expert in a field, it is a good idea to get to know the language of that field. Otherwise, you will be like someone near and dear to me who went to her first “Stock Show” dressed in high heels and an elegant dress, presuming that a “Stock Show” would be full of financiers and Wall Street types... turns out, that was a lot of bull!

