ADVANCED TARGETING SYSTEMS

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CONCENTRATION CALCULATIONS
Convert molarity to mg/ml and mg/ml to molarity

Normally, our concentrations are given in units of milligrams per milliliter (mg/ml), but often data sheet quality assurance data are expressed in molarity (moles per liter, M) or fractions of that (e.g., micromolar (μM), 10^{-6} M, or nanomolar (nM), 10^{-9} M). Here is how to convert between these units.

FROM (mg/ml) TO molarity (M):

Divide the concentration (mg/ml) by the molecular weight. We will use the example of a typical immunotoxin that has a molecular weight of 210,000 grams per mole (or mg/mmole or kDa) (the molecular weight is usually found on the data sheet) and a common concentration is 1.0 mg/ml.

$$\frac{1.0 \text{ mg/ml}}{2.1 \times 10^{5} \text{ mg/mmole}} = 0.48 \times 10^{-5} \text{ mmole/ml}$$

$$= 4.8 \times 10^{-6} \text{ mmole/ml}$$

In the first line, the mg units cancel each other, leaving units of mmole/ml that is equal to moles/liter or molar (M). Therefore, 0.48×10^{-5} mmole/ml = 0.48×10^{-5} M or 4.8×10^{-6}M. This, of course, can be expressed as 4.8 μM, or 4.8 micromolar.

In summary: concentration (grams per liter) ÷ molecular weight (grams per mole) = moles per liter.

FROM molarity (M) TO (mg/ml):

Multiply the molar concentration (M, or moles per liter) by the molecular weight. In an example of an immunotoxin at 1.0 nM concentration (1.0 nmoles per liter or 1.0×10^{-9} M or 1.0×10^{-9} moles per liter) again using as an example, a targeted toxin of molecular weight 210,000 grams per mole (or mg/mmole or kDa):

$$1.0 \times \mathbf{10}^{-9} \text{ moles per liter} \times 2.1 \times 10^{5} \text{ grams per mole} = 2.1 \times 10^{-4} \text{ grams per liter}$$

$$= 2.1 \times 10^{-1} \ \mu\text{g/ml}$$

$$= 0.21 \ \mu\text{g/ml}$$

In summary: molar concentration (moles per liter) x molecular weight (grams per mole) = grams per liter.