

Converting Protein Mass Concentration to Molar Concentration, Or Vice Versa

From mass concentration to molar concentration:

The simple formula is:

$$(\mu\text{M}) = (\mu\text{g/mL}) / (\text{MW in KD}),$$

$$(\text{nM}) = (\text{ng/mL}) / (\text{MW in KD}),$$

$$(\text{pM}) = (\text{pg/mL}) / (\text{MW in KD}).$$

For example:

If the amount of the protein you purchased is 20 μg , and the total volume is 100 μL (0.1 mL), then this protein product's mass concentration will be

$$20 \mu\text{g} / 0.1 \text{ mL} = 200 \mu\text{g/mL}.$$

If the MW (Molecular Weight) of the protein is 40 KD, then the molar concentration for this protein product is $200 (\mu\text{g/mL}) / 40 (\text{KD}) = 5 \mu\text{M}$.

From molar concentration to mass concentration:

The simple formula is:

$$(\mu\text{g/mL}) = (\mu\text{M}) * (\text{MW in KD}),$$

$$(\text{ng/mL}) = (\text{nM}) * (\text{MW in KD}),$$

$$(\text{pg/mL}) = (\text{pM}) * (\text{MW in KD}).$$

For example:

If the protein molar concentration is labeled as 2 μM , and the MW of the protein is 40 KD, then this protein product's mass concentration will be

$$2 (\mu\text{M}) * 40 (\text{KD}) = 80 \mu\text{g/mL}.$$