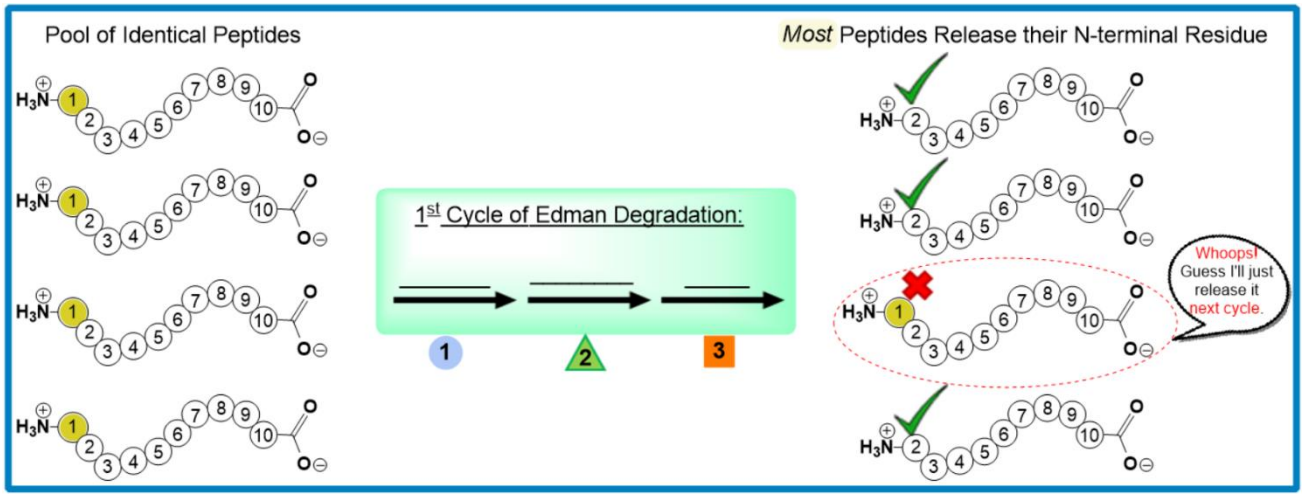
CONCEPT: EDMAN DEGRADATION REACTION EFFICIENCY

●Edman degradation: *only practical* for *small* peptides with _____ *than ~50* amino acid residues…but why?

□ Reaction efficiency per cycle for most modern Edman Degradation Sequenators is about ____%.

□ So, in each cycle, about ____% of the peptides *fail* to release their amino acid in the *correct* cycle.

EXAMPLE: Edman degradation reaction efficiency.



●Unwanted PTH-amino acid _____-products accumulate with *each cycle* & *obscure* the results.

□ _____ proteins mean *more* Edman cycles needed & *more* side-products accumulating.

□ *Most* naturally existing proteins are long; therefore, solution is to _____ proteins *before* Edman Degradation.

Calculating Cumulative Yield

●_____ yield is calculated from the *reaction efficiency*.

□ *Cumulative yield*: relative _____ of a specific product (ex. PTH-amino acid) obtained in a chemical reaction.

●Equation below expresses the relationship between 1) *reaction efficiency*, 2) *# of Edman cycles*, & 3) *cumulative yield*.

$$(Reaction\ Efficiency\ Per\ Cycle)^{\#\ of\ Cycles} = Cumulative\ Yield$$

●Accurate protein sequencing requires a *high* cumulative yield usually _____ than 60%.

□ 60% of the products of the Edman cycle are the *correct* PTH-amino acid.

EXAMPLE: Let's say each reaction cycle of the Edman Degradation procedure has a reaction efficiency of 99%, where 1% of each reaction cycle produces unwanted PTH-amino acid side-products. Calculate the total cumulative yield of the correct PTH-amino acid immediately after the 50th Edman degradation cycle.

CONCEPT: EDMAN DEGRADATION REACTION EFFICIENCY

PRACTICE: Assuming 98% reaction efficiency, calculate the total cumulative yield of the correct PTH-amino acid at the 50^{th} Edman degradation cycle.

PRACTICE: A) A peptide with the primary structure Lys-Arg-Pro-Leu-Ile-Asp-Gly-Ala is sequenced by the Edman degradation procedure. If each Edman cycle is 93% efficient, what percentage of the PTH-amino acids in the fourth Edman cycle will be PTH-Leu?

B) What percentage of the PTH-amino acids in the eighth Edman cycle will be PTH-Ala?