CONCEPT: CHYMOTRYPSIN

●Protein breakdown is a critical to living systems for many reasons, including the following _____:

1) Proteins/enzymes that are no longer needed are *degraded* so their amino acids can be _____.

2) Proteins ingested through *diet* need to be broken down to be _____ into the intestines.

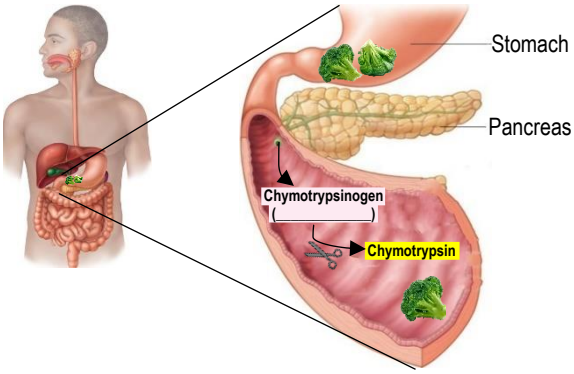
□ Recall: *Peptidases*: the specific class of enzyme that catalyze protein _____.

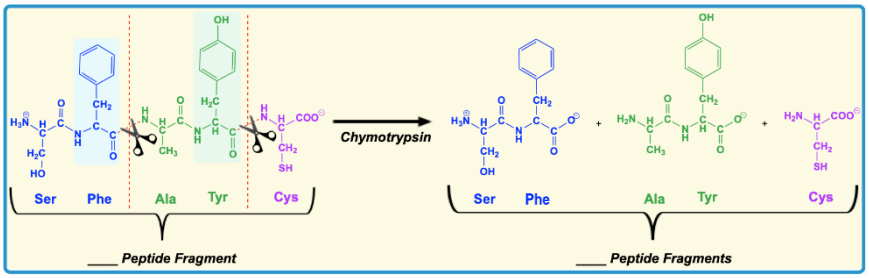
●_____: a digestive *hydrolyase* (peptidase) enzyme that breaks down proteins.

□ Preference for cleaving the ____-terminal end of *aromatic* amino acid residues (_____, _____, _____).

□ Secreted by the _____ in response to eating a meal.

EXAMPLE: Chymotrypsin Review.





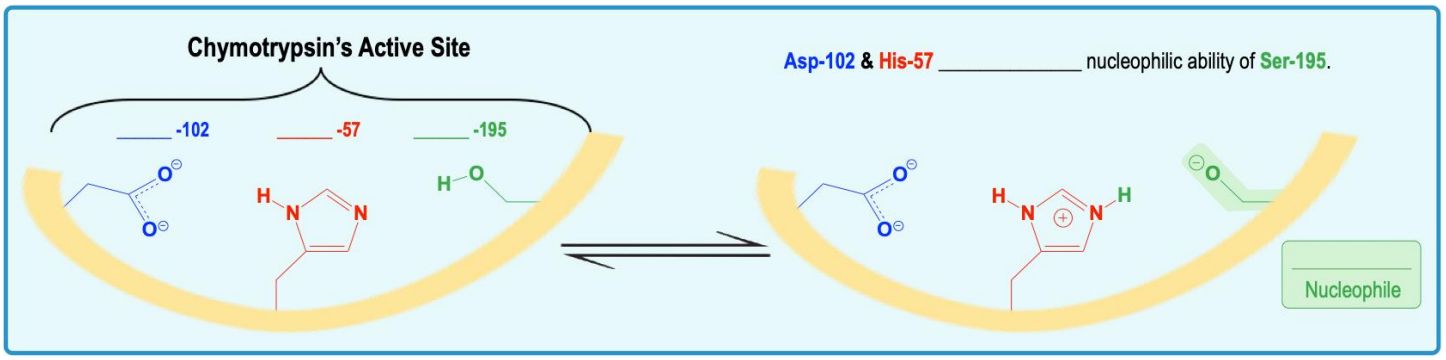
Chymotrypsin's Active Site

●Chymotrypsin uses *Michaelis-Menten* kinetics, *multiple* catalysis mechanisms & is one of the best studied enzymes.

□ Stabilizes the _____ state via *covalent* & *general-acid-base* catalysis.

●*Catalytic* _____: *Aspartate*-102, *Histidine*-57 & *Serine*-195 are in the *active site* & *required* for chymotrypsin's catalysis.

EXAMPLE: Chymotrypsin's Active Site.



●His-57 _____ bonds with both Ser-195 & Asp-102 to establish Ser-195 as a *stronger* _____.

□ Asp-102 positions His-57 to act as a *better* _____ & accept H^+ from Ser 195 to enhance its nucleophilicity.

CONCEPT: CHYMOTRYPSIN

PRACTICE: Which amino acids in chymotrypsin's active site are critical participants in the cleavage of the substrate?

a) His, Ser, Asn.
b) His, Ser, Asp.
c) His, Ser.
d) Asp, Lys.

PRACTICE: The following polypeptide N-G-I-F-D-A-Y-G-N-T-W-R-A-P-C-F-V-A is cleaved by chymotrypsin to produce multiple peptide fragments. Based on the specificity of chymotrypsin cleavage, how many peptide fragments are produced?

a) 2 peptide fragments.
b) 3 peptides fragments.
c) 4 peptide fragments.
d) 5 peptide fragments.
e) 6 peptide fragments.
f) No cleavage event occurs

PRACTICE: The activity of chymotrypsin drastically changes as the pH fluctuates in the relatively small range of pH 5-9. What amino acid residue in chymotrypsin's active site is most likely to be responsible for this effect of pH?

a) Asp-102.
b) His-157.
c) Ser-195.
d) Tyr-23.
e) Cys-198.
f) Asn-122.