

CONCEPT: CHARGED AMINO ACIDS

● *Charged amino acids*: amino acids with R-groups that are electrically _____ at physiological pH.

□ _____ groups of charged amino acids:

1) Negatively charged (Acidic) 2) Positively charged (Basic)

Charged Amino Acids:

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Negatively Charged/Acidic Amino Acids

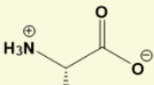
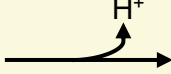
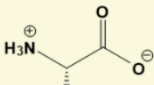
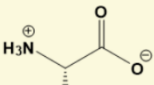
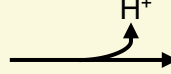
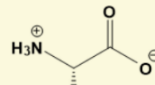
● *Acidic amino acids*: contain acidic R-groups that donate H^+ , resulting in a _____ charge.

□ Includes Asp & Glu.

● Presence of _____ acids in the R-groups render these amino acids _____.

EXAMPLE:

Negatively Charged/Acidic Amino Acids

Aspartic Acid, _____, _____	Glutamic Acid, _____, _____
 Aspartic Acid   Aspartate	 Glutamic Acid   Glutamate
Notes: -D is Ala with a _____ group. -Aspartic acid donates H^+ to become _____ with a negative charge.	Notes: -E is Gln with a _____ group instead of an amide. -Glutamic acid donates H^+ to become _____ with a negative charge.

Positively Charged/Basic Amino Acids

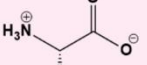


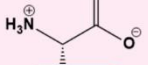


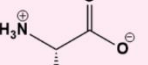

● *Basic amino acids*: contain basic R-groups that accept H^+ , resulting in a _____ charge.

□ Includes Lys, Arg, & His.

● Presence of ionizable _____ in the R-groups render these amino acids _____.

EXAMPLE:

Positively Charged/Basic Amino Acids

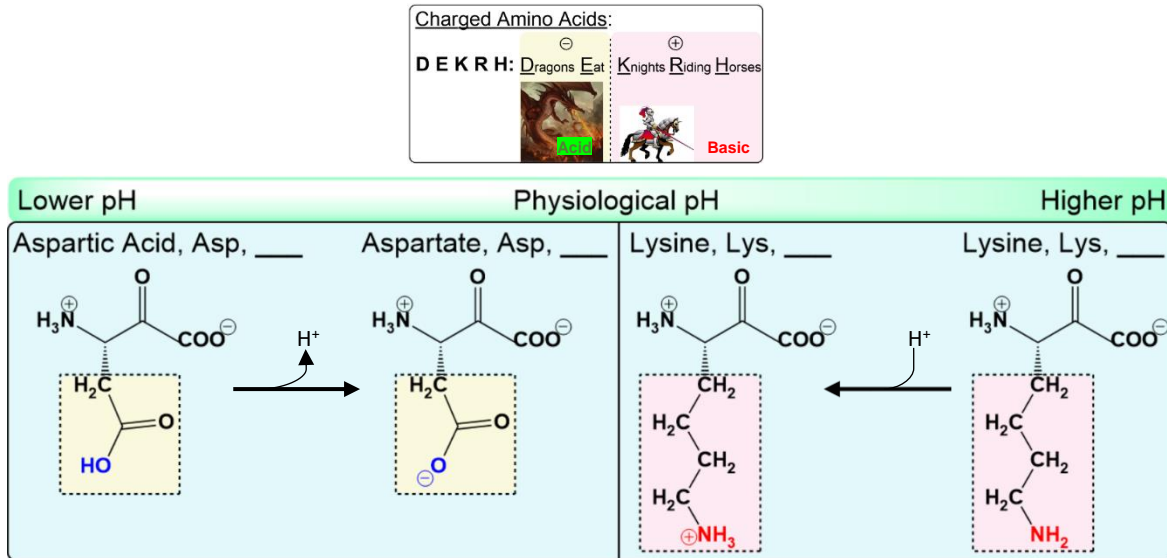
Lysine, _____, _____	Arginine, _____, _____	Histidine, _____, _____
  	  	 
Notes: -Looks like a Knight's _____. -"K" has 4 pointy ends, so there's a _____ carbon start to the chain. -_____ group at the end.	Notes: -R has features of a _____ & a _____. -"R" has 3 pointy ends, so there's a _____ carbon start to the chain. -_____ angular nitrogen structure at bottom.	Notes: -His is Ala with a 5-membered-ring. -"H" has 2 parallel lines, so ring has _____ double bonds & _____ nitrogens. -Looks kind of like a sideways _____ orse. -Horse is _____ of stepping on the other _____.

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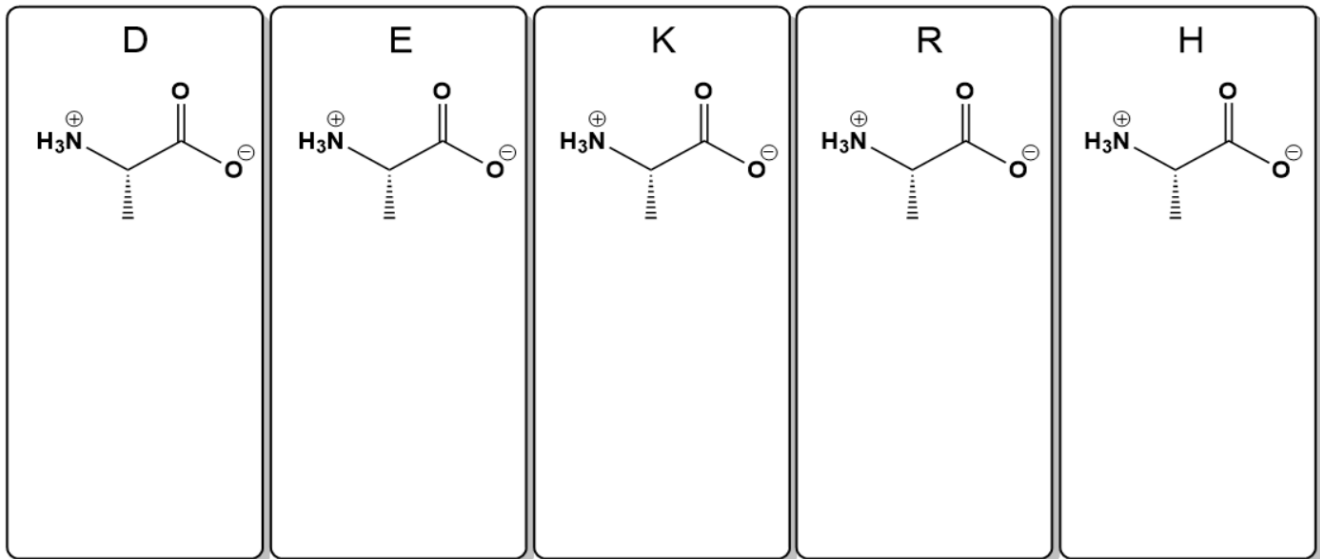
Grouping Charged Amino Acids as Acids or Bases

- Recall: 1) Acids _____ H^+ . 2) Bases _____ H^+ .
- Question: Why aren't positively-charged amino acids (K, R, H) grouped as acidic if they have "extra" H's to donate?
 - Acid/base groupings of amino acids are defined by behaviors under _____ conditions (pH ~7).

EXAMPLE:

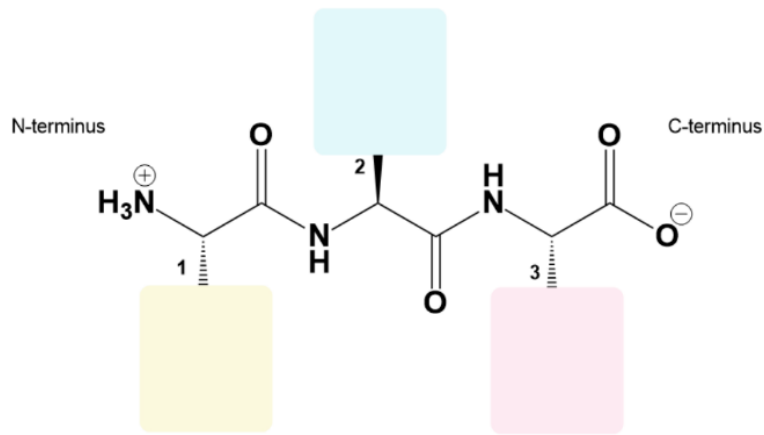


PRACTICE: Draw in the R-groups from memory for each of the charged amino acids at physiological pH.



CONCEPT: CHARGED AMINO ACIDS

PRACTICE: Fill-in the missing R-groups for the following peptide from memory: H-E-K. Circle the acidic amino acids.



PRACTICE: Which of the following amino acids does not have a basic R-group?

- a) H
- b) S
- c) R
- d) K

PRACTICE: Circle all the following amino acids with a basic R-group.

- a) Asp
- b) Lys
- c) A
- d) E
- e) Asn