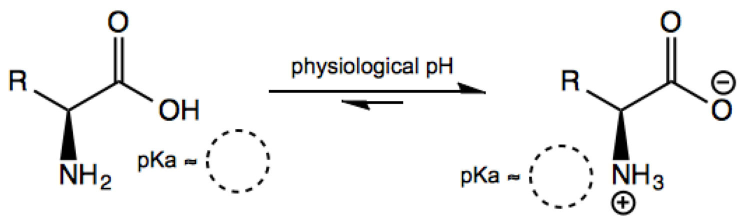
CONCEPT: ACID-BASE PROPERTIES OF AMINO ACIDS

Up to this point we have represented amino acids as neutral structures.

● However, at physiological pH (7.4), amino acids exist as ***zwitterions*** (net neutral molecule with ___________ of charges)

  □ In Determining Acid-Base Equilibrium, we learned that the side of the reaction with the ___ pKa is favored

    - From now on, we'll be representing amino acids/peptides in their *zwitterionic* form:



Determining the Predominant Forms of Amino Acids:

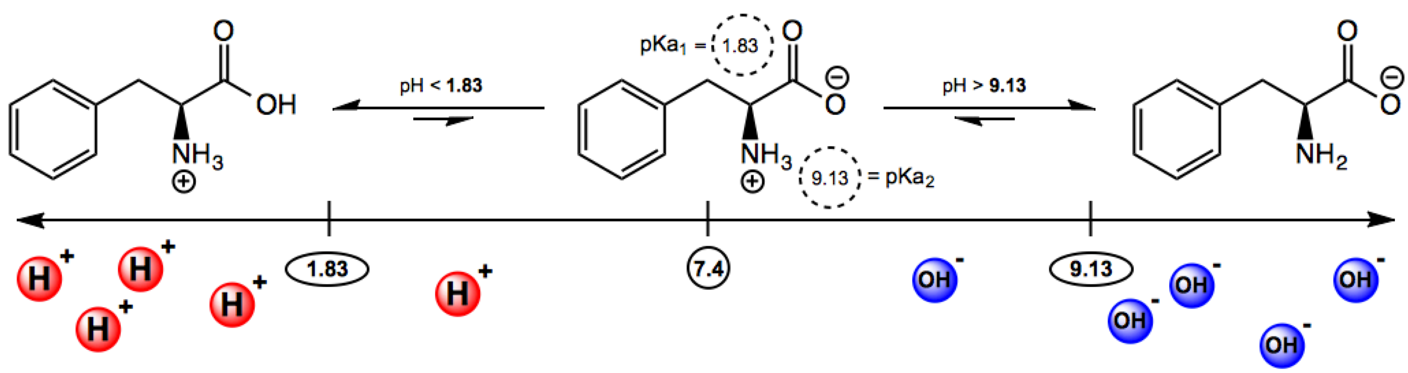
Amino acids are ***amphoteric***, meaning that they can react either as an _________ or as a __________.

● We will be using pKa values to determine the ionized forms at any pH (see Amino Acid Breakdown for values)

  □ Remember, according to H/H equation, when pH = pKa, exactly half of the functional group is ionized

  □ When pH < pKa, protonated form predominates. When pH > pKa, deprotonated form predominates

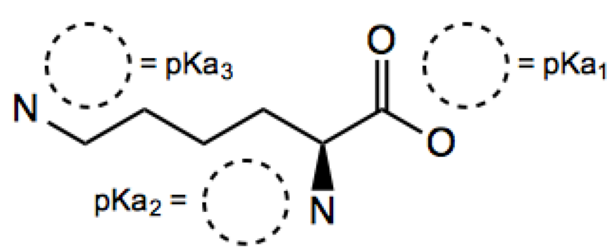
EXAMPLE: Ionized forms of phenylalanine (**F**) at various pH



● Additionally, 7 of 20 amino acids have ionizable sidechains. You may need to memorize these 7 pKas.

  □ When predicting the ionization of these, we must take into account the pKa of the sidechain as well

EXAMPLE: Predict the predominant form of lysine (**K**) at pH 8.5. What is the net charge?



PRACTICE 1: Predict the predominant form and net charge of tyrosine (**Y**) at pH 10. What is the net charge?

PRACTICE 2: Determine the net charge of the dipeptide **R**-**C** at pH 4.3. (Hint: Peptide bonds do not count)