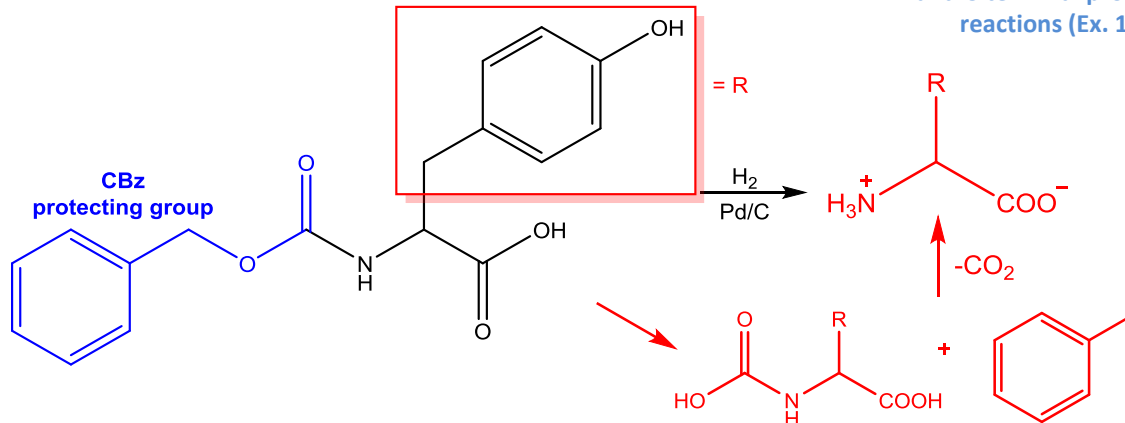


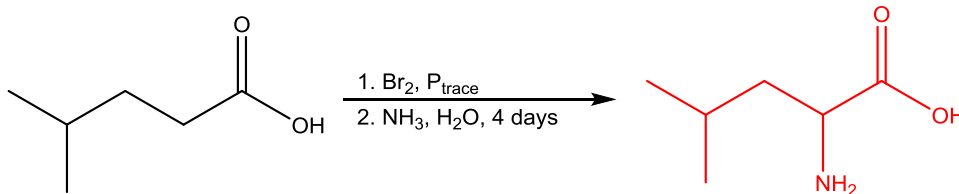
## Amino Acids

Ex. 1: Predict the major product for the following:

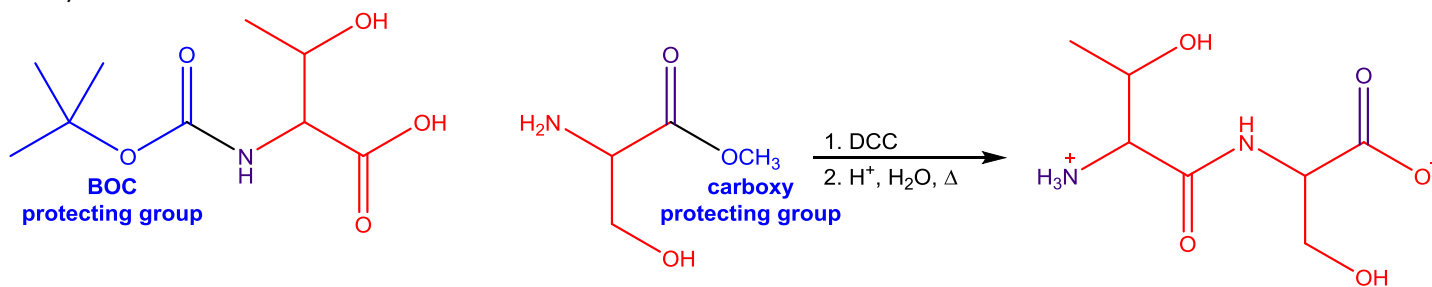
a)



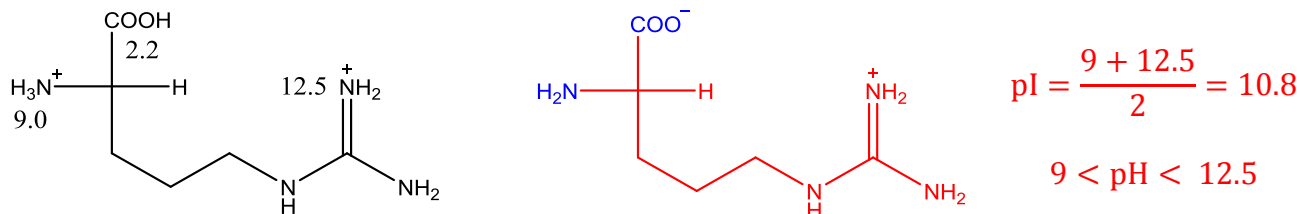
b)



c)



Ex. 2: Determine the pH at which the following amino acid exists as a zwitterion (AKA isoelectric point):

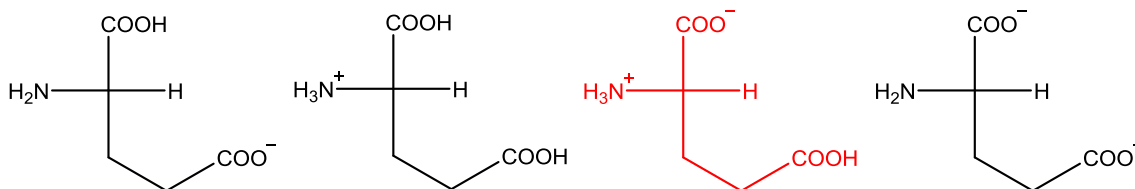


Ex. 3: Which of the following structures of glutamic acid is a zwitterion? Given the following  $pK_a$ 's, determine the  $pI$ :

$\alpha$ -COOH: 2.2

$\alpha$ - $NH_3^+$ : 9.7

R group: 4.3

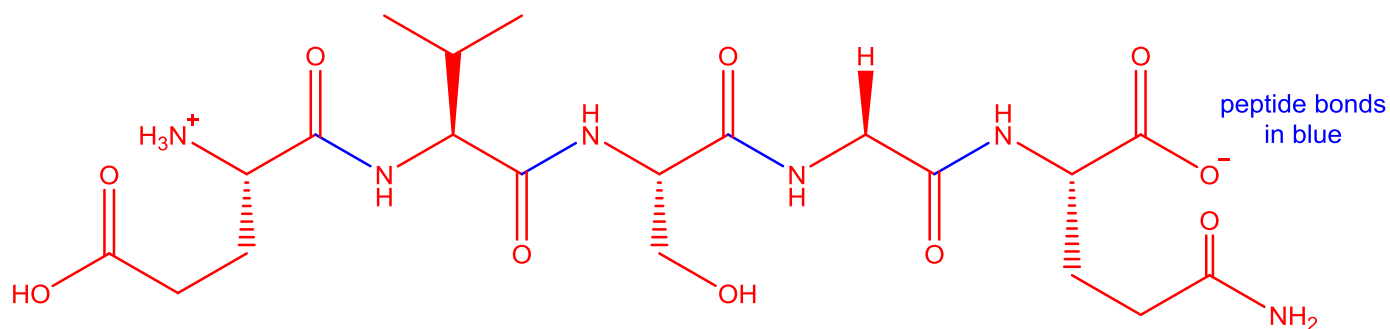


$$pI = \frac{2.2 + 4.3}{2} = 3.25$$

$$2.2 < pH < 4.3$$

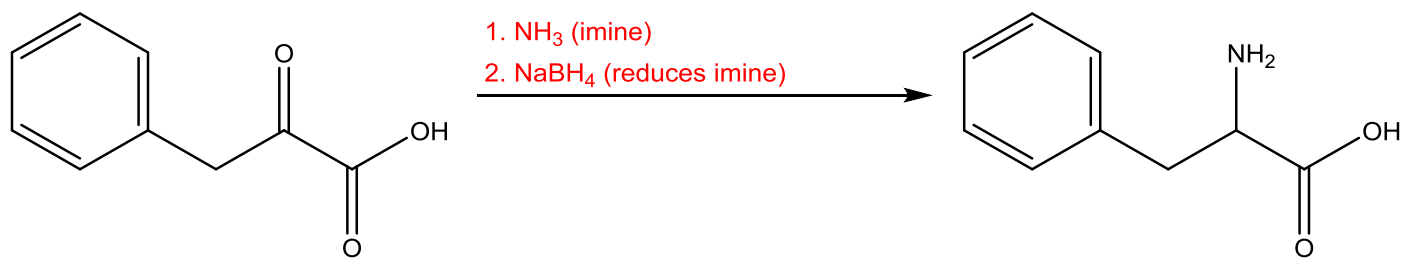
## Amino Acids

Ex. 4: Draw the structure of the following pentapeptide: Glu-Val-Ser-Gly-Gln (Refer to Table 26-1 in text for R groups)

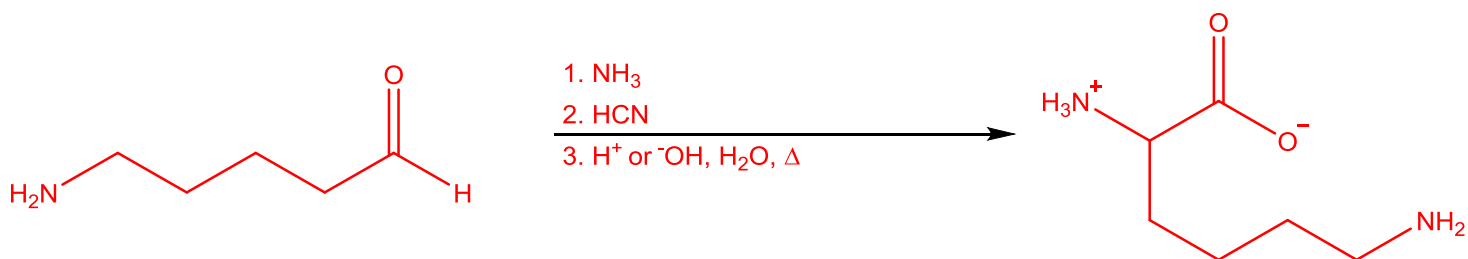


Ex. 5: Propose a synthesis for the following:

a)



b) Lysine using the Strecker Synthesis



c) Isoleucine using Gabriel Malonic Ester Synthesis (start from phthalimide)

