**AMINO ACID WORKSHEET**

The pKa values associated with some amino acids are shown in the Table:

|  |  |  |  |
| --- | --- | --- | --- |
| Amino acid | pKa1 | pKa2 | pKa side chain |
| alanine | 2.34 | 9.69 |  |
| phenylalanine | 1.83 | 9.13 |  |
| serine | 2.21 | 9.15 |  |
| methionine | 2.28 | 9.21 |  |
| glutamic acid | 2.19 | 9.67 | 4.25 |
| lysine | 2.18 | 8.95 | 10.53 |

1. For each amino acid:

a. Draw the major structure in solution at pH = 1.5

b. Determine the value of pI for this acid

c. Draw the major structure in solution at the pI

d. Draw the major structure in solution at pH = 13.0

e. Two of the acids have a 4th structure. Draw this for each and indicate the approximate pH at which these will exist.

f. Assign each acid to the category of non-polar, polar acidic, polar basic, or polar neutral (I used a different classification)

2. There are 3 tripeptides that consist of 2 alanine and 1 serine residues. Draw these as zwitterions labelling each using both the 3 letter and 1 letter abbreviations.