

Session #31: Homework Problems

Problem #1

Rank the following amino acids in decreasing order of migration towards the cathode (negative electrode) when separated by electrophoresis in a solution of $\text{pH} = 7.3$.

- I. Lysine: $\text{pI} = 9.87$
- II. Alanine: $\text{pI} = 6.02$
- III. Aspartate: $\text{pI} = 5.95$

Problem #2

Define what is meant by isoelectric point (pI) and give an example.

Problem #3

You are given a mixture that contains glutamic acid ($\text{pI} = 3.2$), arginine ($\text{pI} = 10.8$), and valine ($\text{pI} = 6.0$), and you subject the mixture to electrophoresis.

- (a) Which amino acids migrate towards the cathode when the electrophoresis is carried out at a pH of 7.1?
- (b) Which amino acids migrate toward the anode when the electrophoresis is carried out at a pH of 7.1?
- (c) Which amino acid migrates farthest toward the anode at a pH of 7.1?

Problem #4

Draw the dipeptide Val-Tyr at $\text{pH} 7.0$.

Problem #5

Draw the structure of the tetrapeptide Ser-Leu-Phe-Pro at $\text{pH} 7.0$.

Problem #6

The pK_a values for the α -carboxylic acid and the α -amino acid groups in cysteine are 1.092 and 10.78, respectively. The pK_a for the titratable $-\text{SH}$ side chain in the amino acid is 8.33. Calculate the pI of cysteine.

MIT OpenCourseWare
<http://ocw.mit.edu>

3.091SC Introduction to Solid State Chemistry
Fall 2009

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.