EngineeringRise

Amino acids, proteins, enzymes and vitamins

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Zwitterion	H3N+-CHR-COO- Valid when: alpha-amino acid near its isoelectric point, in solution	net charge 0
Peptide bonds, linear chain	n residues: n - 1 bonds; n - 1 H2O on hydrolysis Valid when: linear (unbranched, non-cyclic) peptide chain of n residues	count (mol)
Sequences with repetition	k^L Valid when: each of L positions filled independently from k kinds, order matters	count
Sequences, each distinct unit used once	k! Valid when: L = k positions, each kind used exactly once, order matters	count
pI, neutral amino acid	(pKa1 + pKa2)/2 Valid when: neutral amino acid with no ionisable side chain	pH
pI, acidic amino acid	mean of the two carboxylic acid pKa values Valid when: amino acid with an extra COOH side chain (Asp, Glu)	pH
pI, basic amino acid	mean of the two ammonium pKa values Valid when: amino acid with an extra basic side chain (Lys, Arg, His)	pH
Fat-soluble vitamins	A, D, E, K (water-soluble: B group, C)	n/a (classification)
Denaturation	loses secondary, tertiary and quaternary; primary kept	n/a (qualitative)

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/biomolecules/amino-acids-proteins-enzymes-and-vitamins

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