

Mass Changes Resulting from Typical Post-Translational Modifications of Proteins and Peptides

| Modification | Monoisotopic Mass Change | Average Mass Change |
|--|--------------------------|---------------------|
| Homoserine formed from Met by CNBr treatment | -29.99281 | -30.0935 |
| Pyroglutamic acid formed from Glutamine | -17.02655 | -17.0306 |
| Disulfide bond formation | -2.01565 | -2.0159 |
| C-terminal amide formed from Glycine | -0.98402 | -0.9847 |
| Deamidation of Asparagine or Glutamine | 0.98402 | -0.9847 |
| Methylation | 14.01565 | 14.0269 |
| Oxidation of Methionine | 15.99491 | 15.9994 |
| Hydroxylation | 15.99491 | 15.9994 |
| Proteolysis of a single peptide bond | 18.0106 | 18.0153 |
| Formylation | 27.99491 | 28.0104 |
| Acetylation | 42.01056 | 42.0373 |
| Carboxylation of Aspartic Acid or Glutamic Acid | 43.98983 | 44.0098 |
| Carboxyamidomethylcysteine (CAM) from Cysteine (Iodoacetamide) | 57.02146 | 57.0520 |
| Carboxymethylcysteine (CME) from Cysteine (Iodoacetic acid) | 58.00548 | 58.0367 |
| Sulfation | 79.95682 | 80.0624 |
| Phosphorylation | 79.96633 | 79.9799 |
| Pyridylethyleysteine (PE-Cys) from Cys (4-vinylpyridine) | 105.05785 | 105.1393 |
| Cysteinylation | 119.00410 | 119.1442 |
| Pentoses (Ara, Rib, Xyl) | 132.04226 | 132.1161 |
| Deoxyhexoses (Fuc, Rha) | 146.05791 | 146.1430 |
| Hexosamines (GalN, GlcN) | 161.06881 | 161.1577 |
| Hexoses (Fru, Gal, Glc, Man) | 162.05282 | 162.1424 |
| Lipoic acid (amide bond to Lysine) | 188.03296 | 188.3147 |
| N-acetylhexosamines (GalNAc, GlcNAc) | 203.07937 | 203.195 |
| Farnesylation | 204.18780 | 204.3556 |
| Myristoylation | 210.19836 | 210.3598 |
| Biotinylation (amide bond to Lysine) | 226.07760 | 226.2994 |
| Pyridoxal phosphate (Schiff Base formed to Lysine) | 231.02966 | 231.1449 |
| Palmitoylation | 238.22966 | 238.4136 |
| Stearoylation | 266.26096 | 266.4674 |
| Geranylgeranylation | 272.2504 | 272.4741 |
| N-acetylneuraminic acid (Sialic acid, NeuAc, NANA, SA) | 291.09542 | 291.2579 |
| Gluthathionylation | 305.06816 | 305.3117 |
| N-glycolylneuraminic acid (NeuGc) | 307.08003 | 307.2573 |
| 5'-Adenosylation | 329.05252 | 329.2091 |
| 4'-Phosphopantetheine | 339.07797 | 339.3294 |
| ADP-ribosylation (from NAD) | 541.06111 | 541.3052 |