|  |
| --- |
| STANDARD OPERATING PROCEDURE |
|

|  |
| --- |
| **Title: Repeatability/Validation (Experiment 2) for a panel of phosphopeptide assays** |
|  |  |
| **Version #: 3** | **Author: Broad Institute Proteomics Platform – Carr Lab** |
| **Date: August 1, 2016** | **BRD-003** |

 |

# Purpose

The purpose of this document is to describe the generation of a repeatability/validation experiment for a panel of phosphopeptides.

# Scope

This procedure may be used to evaluate the repeatability/validation of IMAC enrichment and analysis by targeted mass spectrometry of phosphopeptides in a digested background matrix (cells, tissues, plasma, etc).

# Responsibilities

It is the responsibility of person(s) performing this procedure to be familiar with laboratory safety procedures. The interpretation of results must be done by a person trained in the procedure and familiar with such interpretation.

# Equipment

1. Microcentrifuge
2. Quantiva TSQ Mass spectrometer (Thermo)
3. Easy NanoLC 1000 liquid chromatograph (Thermo)

# Materials

1. HPLC water
2. formic acid (Fluka, 56302)
3. acetonitrile

# Reagents

**Standards:**

1. Heavy stable isotope standards (H-SIS), 2 pmol/uL, 30% acetonitrile/0.1% formic acid (New England Peptide)
2. Light stable isotope standards (L-SIS), 3.2 pmol/uL, 30% acetonitrile/0.1% formic acid (New England Peptide)
3. Michrom mix: 50 fmol/uL digest of 6 equimolar bovine proteins (Michrom Bioresources, #PTD/00001/63) in 3% acetonitrile/5% acetic acid [Note: this product is no longer commercially available]

**Matrix:**

MCF7 cell lysate, desalted and dried into a tube in 5 mg aliquots, as described in SOP\_Broad\_SamplePrep&PhosphoEnrich\_03, BRD-001 “Cell Lysis, Tryptic Digestion, and Phosphopeptide Enrichment by Automated Immobilized Metal Affinity Chromatography (IMAC)”

# Solutions

1. 50% acetonitrile
2. 80% acetonitrile
3. 3% acetonitrile/5% formic acid
4. Reconstitution buffer: 24 uL heavy peptide standard mix, 1176 uL 3% acetonitrile/5% formic acid

# Procedure

1. **Determination of spike levels**
	1. Based on preliminary reverse curve results and following the CPTAC assay characterization guidance document, three levels for “Hi”, “Med”, and “Lo” repeatability were determined.
		1. “Hi” = 2 fmol/ug
		2. “Med” = 0.5 fmol/ug
		3. “Lo” = 0.1 fmol/ug
	2. Five replicates of these samples were prepared by adding H-SIS phosphopeptides into digested, desalted lysate at each of the three concentration levels. These samples were then frozen. On each of 5 non-overlapping consecutive days, a set of samples were thawed and spiked with standard amount of L-SIS phosphopeptides (five replicates of each L-SIS were also prepared and frozen), enriched using automated IMAC and analyzed by targeted mass spectrometry.

*Three concentration levels (2 fmol/ug; 0.5 fmol/ug; 0.1 fmol/ug) were tested in a singlicate trial run of this protocol and were confirmed to be suitable appropriate concentrations for this experiment.*

1. **Preparation of Repeatability Samples – Completed for all Days prior to any enrichment and analysis**
	1. Cell lysates were prepared as described in SOP\_Broad\_SamplePrep&PhosphoEnrich\_03, BRD-001 “Cell Lysis, Tryptic Digestion, and Phosphopeptide Enrichment by Automated Immobilized Metal Affinity Chromatography (IMAC)”.
	2. Resuspend cell lysates in 50% acetonitrile to a final concentration of 2 mg/ml.
	3. Label 15 microcentrifuge tubes (1.5 mL): label five “Lo”, five “Med” and five “Hi”.
	4. Aliquot 750 uL of 2 mg/mL digested, desalted lysate to each tube.
	5. Prepare a mixture of heavy phosphospeptides from H-SIS stock mixture (2 pmol/uL) in a single tube for each of the 3 levels of concentration as described below:
		1. Lo – (0.1 fmol/ug): make 50 fmol/uL H-SIS working stock; 1 uL H-SIS stock + 19 uL 80% ACN
		2. Med – (0.5 fmol/ug): make 250 fmol/uL heavyH-SIS working; 1.56 uL H-SIS stock + 18.44 uL 80% ACN
		3. Hi – (2 fmol/ug): make 1 pmol/uL H-SIS working stock; 6.25uL H-SIS stock + 13.75 uL 80% ACN
2. **Preparation of Sample Plate – Performed each day of enrichment for 5 days**
	1. Remove and thaw one aliquot of each of the following previously prepped samples:
		1. Light SIS stock (10uL at 3.2pmol/uL)
		2. “Hi” sample
		3. “Med” sample
		4. “Low” sample
	2. Add 3.2 uL from Light-SIS stock to 96.8 uL 30% ACN to bring final concentration to 100 fmol/uL.
	3. Add 3 uL of 100 fmol/uL Light-SIS to each of the 3 sample tubes (“Hi”, “Med”, “Lo”).
	4. Divide each concentration point into process triplicate on the plate, as depicted below:



* 1. Follow IMAC enrichment protocol on AssayMAP Bravo as described in SOP\_Broad\_SamplePrep&PhosphoEnrich\_03, BRD-001, “Cell Lysis, Tryptic Digestion, and Phosphopeptide Enrichment by Automated Immobilized Metal Affinity Chromatography (IMAC)” to enrich phosphopeptides.
1. **Reconstitution of samples for analysis by mass spectrometry**
	1. After IMAC enrichment samples will be dried in autosampler vials.
	2. Resuspend dried samples in 10 uL of Reconstitution buffer (10fmol/ul double heavy SIS enrichment standards in 3% acetonitrile/5% formic acid, prepared fresh).
	3. Sonicate and vortex to resuspend phosphopeptides; centrifuge briefly (20 s at 1000 x g) to bring all liquid to the bottom of autosampler vial.
2. **NanoLC-MRM-MS analysis**
	1. set up the TSQ-Quantiva MS with Easy NanoLC1000 and the following:
		1. Q1 resolution 0.2
		2. Q3 resolution 0.7
		3. 1.5 min cycle time
		4. CID gas 1.5
		5. 0.075 x 150 mm PicoFrit Reprosil C18, 1.9 um, 200 Å pore size, (Dr. Maisch GmBH) PicoFrit column
		6. mobile phase A: 3% acetonitrile/0.1% formic acid, mobile phase B: 90% acetonitrile/0.1% formic acid
		7. flowrate: 200 nL/min
		8. column temperature: 50 oC
		9. gradient: 0 – 6% B in 1 min, 6 – 30%B in 50 min, 30 – 60%B in 5 min, 60 – 90%B in 1 min, hold 90%B for 3 min. (60 min total time)
		10. injection volume: 2 uL
	2. Prior to analysis, LC-MS/MS of a mixture of H-SIS peptides was performed on a high resolution MS (QExactive) to generate spectral libraries. These were imported into Skyline and used to selected MRM transitions for each peptide. The best 5-10 transition m/z’s were selected and the H-SIS was analyzed by LC-MRM-MS. The best 3-5 transition ions including those required to verify the specificity of the phosphosite were then selected for further sample analysis. See Appendix 2 for scheduled MRM method used to acquire the data.
3. **Run order**
	1. Samples are analyzed in random run order as described below:



1. **Data Analysis**
	1. Raw files were imported into Skyline.
	2. Extracted Ion chromatograms (XIC) of all transition ions were integrated using a Skyline document (Skyline daily version 3.5 <https://brendanx-uw1.gs.washington.edu/labkey/project/home/software/Skyline/begin.view>).
	3. Integrated peaks were manually inspected to confirm proper integration and detection of the transitions for the corresponding light and heavy peptides.

# Referenced Documents

Protocol for automated IMAC enrichment:

Abelin et al Reduced-representation Phosphosignatures Measured by Quantitative Targeted MS Capture Cellular States and Enable Large-scale Comparison of Drug-induced Phenotypes.

[Mol Cell Proteomics.](http://www.ncbi.nlm.nih.gov/pubmed/26912667) 2016 May;15(5):1622-41. doi: 10.1074/mcp.M116.058354. Epub 2016 Feb 24. PMID:26912667

Discovery of phosphosite targets:

Mertins et al. Ischemia in tumors induces early and sustained phosphorylation changes in stress kinase pathways but does not affect global protein levels.

[Mol Cell Proteomics.](http://www.ncbi.nlm.nih.gov/pubmed/24719451) 2014 Jul;13(7):1690-704. doi: 10.1074/mcp.M113.036392. Epub 2014 Apr 9.

# Appendix 1. Proteins, Peptides and Pathways

|  |  |  |  |
| --- | --- | --- | --- |
| Protein | Peptide Sequence | phosphosite | Biological Pathway |
| ACIN1 | KIsVVSATK | S825  | Apoptosis, mRNA processing, mRNA splicing |
| ARAF | QHEAPSNRPLNELLtPQGPsPR | T181, S186 | apoptosis, protein regulation |
| ARAF | QHEAPSNRPLNELLtPQGPSPR | T181 | apoptosis, protein regulation |
| ARAF | QHEAPSNRPLNELLTPQGPsPR | S186 | apoptosis, protein regulation |
| CIC | AILGsYR | S1389  | Transcription, Transcription regulation |
| GLYR1 | KLsLSEGK | S130  | pentose-phosphate shunt |
| GTF2I | GREFsFEAWNAK | S722  | Transcription, Transcription regulation |
| HMGN1 | KVsSAEGAAKEEPK | S7  | chromatin organization, regulation of transcription, elongation |
| HSPB1 | GPsWDPFRDWYPHSR | S15  | Stress response |
| MAPK1 | VADPDHDHTGFLtEYVATR | T185 | Apoptosis, Cell cycle, Host-virus interaction, Transcription |
| MAPK1 | VADPDHDHTGFLTEyVATR | Y187 | Apoptosis, Cell cycle, Host-virus interaction, Transcription |
| MAPK1 | VADPDHDHTGFLtEyVATR | T185, Y187 | Apoptosis, Cell cycle, Host-virus interaction, Transcription |
| MAPK14 | HTDDEMtGYVATR | T180 | Apoptosis, Stress response, Transcription |
| MAPK14 | HTDDEMTGyVATR | Y182  | Apoptosis, Stress response, Transcription |
| MAPK14 | HTDDEMtGyVATR | T180, Y182 | Apoptosis, Stress response, Transcription |
| MAPK3 | IADPEHDHTGFLtEYVATR | T202 | Apoptosis, Cell cycle, Host-virus interaction |
| MAPK3 | IADPEHDHTGFLtEyVATR | T202, Y204 | Apoptosis, Cell cycle, Host-virus interaction |
| MAPK3 | IADPEHDHTGFLTEyVATR | Y204 | Apoptosis, Cell cycle, Host-virus interaction |
| MTOR | LHVsTINLQK | S1261 | cell growth and response, regulation of phosphorylation, signaling and expression |
| MTOR | KLHVsTINLQK | S1261 | cell growth and response, regulation of phosphorylation, signaling and expression |
| PBRM1 | TYsQDCSFK | S948  | Transcription, Transcription regulation |
| PHIP | AQsYDIQAWKK | S1315  | regulation of apoptosis, cell proliferation, phosphorylation, cytoskeleton organization |
| PRKD2 | LGTSEsLPCTAEELSR | S214 | Adaptive immunity, Angiogenesis, Cell adhesion, Immunity |
| RBM7 | SFsSPENFQR | S136  | Meiosis |
| SHC1 | ELFDDPSyVNVQNLDK | Y427 | Angiogenesis, Growth regulation, Host-virus interaction |
| SMARCA4 | EVDYSDsLTEKQWLK | S775  | Neurogenesis, Transcription, Transcription regulation |
| STMN1 | ASGQAFELILsPR | S66  | Differentiation, Neurogenesis |
| SYNPO2 | SLsLPGR | S25  | protein binding, actin binding, 14-3-3 binding |
| UBE2J1 | QIsFKAEVNSSGK | S184 | Ubl conjugation pathway |
| ZNF638 | NYQSQADIPIRsPFGIVK | S383 | Transcription, Transcription regulation |

# Appendix 2. Scheduled MRM Method

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Compound | Start Time (min) | End Time (min) | Polarity | Precursor (m/z) | Product (m/z) | Collision Energy (V) |
| KVS[+80.0]SAEGAAKEEPK(+3) | 22.81 | 30.81 | Positive | 504.24314 | 415.22434 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK(+3) | 22.81 | 30.81 | Positive | 504.24314 | 558.78021 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK(+3) | 22.81 | 30.81 | Positive | 504.24314 | 585.29348 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK(+3) | 22.81 | 30.81 | Positive | 504.24314 | 642.82515 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK (heavy)(+3) | 22.81 | 30.81 | Positive | 506.91454 | 419.23144 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK (heavy)(+3) | 22.81 | 30.81 | Positive | 506.91454 | 562.78731 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK (heavy)(+3) | 22.81 | 30.81 | Positive | 506.91454 | 585.29348 | 16.4 |
| KVS[+80.0]SAEGAAKEEPK (heavy)(+3) | 22.81 | 30.81 | Positive | 506.91454 | 646.83225 | 16.4 |
| KLS[+80.0]LSEGK(+2) | 26.8 | 34.8 | Positive | 471.23881 | 420.20889 | 18.3 |
| KLS[+80.0]LSEGK(+2) | 26.8 | 34.8 | Positive | 471.23881 | 533.29295 | 18.3 |
| KLS[+80.0]LSEGK(+2) | 26.8 | 34.8 | Positive | 471.23881 | 602.31442 | 18.3 |
| KLS[+80.0]LSEGK(+2) | 26.8 | 34.8 | Positive | 471.23881 | 715.39848 | 18.3 |
| KLS[+80.0]LSEGK (heavy)(+2) | 26.8 | 34.8 | Positive | 475.24591 | 428.22309 | 18.3 |
| KLS[+80.0]LSEGK (heavy)(+2) | 26.8 | 34.8 | Positive | 475.24591 | 541.30715 | 18.3 |
| KLS[+80.0]LSEGK (heavy)(+2) | 26.8 | 34.8 | Positive | 475.24591 | 610.32862 | 18.3 |
| KLS[+80.0]LSEGK (heavy)(+2) | 26.8 | 34.8 | Positive | 475.24591 | 723.41268 | 18.3 |
| KIS[+80.0]VVSATK(+2) | 27.05 | 35.05 | Positive | 506.77556 | 406.22962 | 19.5 |
| KIS[+80.0]VVSATK(+2) | 27.05 | 35.05 | Positive | 506.77556 | 505.29804 | 19.5 |
| KIS[+80.0]VVSATK(+2) | 27.05 | 35.05 | Positive | 506.77556 | 509.34459 | 19.5 |
| KIS[+80.0]VVSATK(+2) | 27.05 | 35.05 | Positive | 506.77556 | 673.38792 | 19.5 |
| KIS[+80.0]VVSATK(+2) | 27.05 | 35.05 | Positive | 506.77556 | 786.47198 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 510.78266 | 414.24382 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 510.78266 | 509.34459 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 510.78266 | 513.31224 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 510.78266 | 681.40212 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 510.78266 | 794.48618 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 514.29124 | 414.24382 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 514.29124 | 513.31224 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 514.29124 | 516.36176 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 514.29124 | 681.40212 | 19.5 |
| KIS[+80.0]VVSATK (heavy)(+2) | 27.05 | 35.05 | Positive | 514.29124 | 801.50334 | 19.5 |
| HTDDEMTGY[+80.0]VATR(+3) | 28.86 | 36.86 | Positive | 525.87636 | 689.30182 | 17 |
| HTDDEMTGY[+80.0]VATR(+3) | 28.86 | 36.86 | Positive | 525.87636 | 729.25083 | 17 |
| HTDDEMTGY[+80.0]VATR(+3) | 28.86 | 36.86 | Positive | 525.87636 | 746.32328 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 529.21245 | 699.31009 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 529.21245 | 729.25083 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 529.21245 | 756.33155 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 531.21705 | 705.3239 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 531.21705 | 729.25083 | 17 |
| HTDDEMTGY[+80.0]VATR (heavy)(+3) | 28.86 | 36.86 | Positive | 531.21705 | 762.34536 | 17 |
| HTDDEMT[+80.0]GY[+80.0]VATR(+3) | 29.97 | 37.97 | Positive | 552.5318 | 415.18384 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR(+3) | 29.97 | 37.97 | Positive | 552.5318 | 446.27216 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR(+3) | 29.97 | 37.97 | Positive | 552.5318 | 464.17228 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR(+3) | 29.97 | 37.97 | Positive | 552.5318 | 598.21035 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR (heavy)(+3) | 29.97 | 37.97 | Positive | 555.86789 | 420.18797 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR (heavy)(+3) | 29.97 | 37.97 | Positive | 555.86789 | 456.28043 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR (heavy)(+3) | 29.97 | 37.97 | Positive | 555.86789 | 469.17642 | 17.8 |
| HTDDEMT[+80.0]GY[+80.0]VATR (heavy)(+3) | 29.97 | 37.97 | Positive | 555.86789 | 598.21035 | 17.8 |
| TYS[+80.0]QDC[+57.0]SFK(+2) | 30.42 | 38.42 | Positive | 608.22303 | 508.71074 | 23 |
| TYS[+80.0]QDC[+57.0]SFK(+2) | 30.42 | 38.42 | Positive | 608.22303 | 656.27084 | 23 |
| TYS[+80.0]QDC[+57.0]SFK(+2) | 30.42 | 38.42 | Positive | 608.22303 | 853.35088 | 23 |
| TYS[+80.0]QDC[+57.0]SFK(+2) | 30.42 | 38.42 | Positive | 608.22303 | 951.32778 | 23 |
| TYS[+80.0]QDC[+57.0]SFK (heavy)(+2) | 30.42 | 38.42 | Positive | 612.23013 | 512.71784 | 23 |
| TYS[+80.0]QDC[+57.0]SFK (heavy)(+2) | 30.42 | 38.42 | Positive | 612.23013 | 664.28504 | 23 |
| TYS[+80.0]QDC[+57.0]SFK (heavy)(+2) | 30.42 | 38.42 | Positive | 612.23013 | 861.36508 | 23 |
| TYS[+80.0]QDC[+57.0]SFK (heavy)(+2) | 30.42 | 38.42 | Positive | 612.23013 | 959.34197 | 23 |
| HTDDEMT[+80.0]GYVATR(+3) | 32.47 | 40.47 | Positive | 525.87636 | 375.20067 | 17 |
| HTDDEMT[+80.0]GYVATR(+3) | 32.47 | 40.47 | Positive | 525.87636 | 446.27216 | 17 |
| HTDDEMT[+80.0]GYVATR(+3) | 32.47 | 40.47 | Positive | 525.87636 | 598.21035 | 17 |
| HTDDEMT[+80.0]GYVATR(+3) | 32.47 | 40.47 | Positive | 525.87636 | 609.33549 | 17 |
| HTDDEMT[+80.0]GYVATR(+3) | 32.47 | 40.47 | Positive | 525.87636 | 869.30941 | 17 |
| HTDDEMT[+80.0]GYVATR (heavy)(+3) | 32.47 | 40.47 | Positive | 529.21245 | 380.2048 | 17 |
| HTDDEMT[+80.0]GYVATR (heavy)(+3) | 32.47 | 40.47 | Positive | 529.21245 | 456.28043 | 17 |
| HTDDEMT[+80.0]GYVATR (heavy)(+3) | 32.47 | 40.47 | Positive | 529.21245 | 598.21035 | 17 |
| HTDDEMT[+80.0]GYVATR (heavy)(+3) | 32.47 | 40.47 | Positive | 529.21245 | 619.34376 | 17 |
| HTDDEMT[+80.0]GYVATR (heavy)(+3) | 32.47 | 40.47 | Positive | 529.21245 | 869.30941 | 17 |
| KLHVS[+80.0]TINLQK(+2) | 34.33 | 42.33 | Positive | 680.87105 | 511.29309 | 23.3 |
| KLHVS[+80.0]TINLQK(+2) | 34.33 | 42.33 | Positive | 680.87105 | 560.28154 | 23.3 |
| KLHVS[+80.0]TINLQK(+2) | 34.33 | 42.33 | Positive | 680.87105 | 645.31199 | 23.3 |
| KLHVS[+80.0]TINLQK(+2) | 34.33 | 42.33 | Positive | 680.87105 | 884.51999 | 23.3 |
| KLHVS[+80.0]TINLQK (heavy)(+2) | 34.33 | 42.33 | Positive | 684.87815 | 515.30019 | 25.4 |
| KLHVS[+80.0]TINLQK (heavy)(+2) | 34.33 | 42.33 | Positive | 684.87815 | 564.28864 | 23.3 |
| KLHVS[+80.0]TINLQK (heavy)(+2) | 34.33 | 42.33 | Positive | 684.87815 | 645.31199 | 25.4 |
| KLHVS[+80.0]TINLQK (heavy)(+2) | 34.33 | 42.33 | Positive | 684.87815 | 892.53419 | 23.3 |
| QIS[+80.0]FKAEVNSSGK(+2) | 35.36 | 43.36 | Positive | 737.85051 | 500.26654 | 27.4 |
| QIS[+80.0]FKAEVNSSGK(+2) | 35.36 | 43.36 | Positive | 737.85051 | 720.35226 | 27.4 |
| QIS[+80.0]FKAEVNSSGK(+2) | 35.36 | 43.36 | Positive | 737.85051 | 791.38937 | 27.4 |
| QIS[+80.0]FKAEVNSSGK (heavy)(+2) | 35.36 | 43.36 | Positive | 741.85761 | 500.26654 | 27.4 |
| QIS[+80.0]FKAEVNSSGK (heavy)(+2) | 35.36 | 43.36 | Positive | 741.85761 | 728.36646 | 27.4 |
| QIS[+80.0]FKAEVNSSGK (heavy)(+2) | 35.36 | 43.36 | Positive | 741.85761 | 799.40357 | 27.4 |
| SLS[+80.0]LPGR(+2) | 37.01 | 45.01 | Positive | 405.19949 | 442.27724 | 16.1 |
| SLS[+80.0]LPGR(+2) | 37.01 | 45.01 | Positive | 405.19949 | 511.29871 | 16.1 |
| SLS[+80.0]LPGR(+2) | 37.01 | 45.01 | Positive | 405.19949 | 609.2756 | 16.1 |
| SLS[+80.0]LPGR (heavy)(+2) | 37.01 | 45.01 | Positive | 410.20362 | 452.28551 | 16.1 |
| SLS[+80.0]LPGR (heavy)(+2) | 37.01 | 45.01 | Positive | 410.20362 | 521.30698 | 16.1 |
| SLS[+80.0]LPGR (heavy)(+2) | 37.01 | 45.01 | Positive | 410.20362 | 619.28387 | 16.1 |
| AILGS[+80.0]YR(+2) | 37.21 | 45.21 | Positive | 430.20731 | 577.30927 | 16.9 |
| AILGS[+80.0]YR(+2) | 37.21 | 45.21 | Positive | 430.20731 | 587.31877 | 16.9 |
| AILGS[+80.0]YR(+2) | 37.21 | 45.21 | Positive | 430.20731 | 675.28617 | 16.9 |
| AILGS[+80.0]YR (heavy)(+2) | 37.21 | 45.21 | Positive | 435.21145 | 587.31754 | 16.9 |
| AILGS[+80.0]YR (heavy)(+2) | 37.21 | 45.21 | Positive | 435.21145 | 587.31877 | 16.9 |
| AILGS[+80.0]YR (heavy)(+2) | 37.21 | 45.21 | Positive | 435.21145 | 685.29444 | 16.9 |
| AQS[+80.0]YDIQAWKK(+2) | 37.47 | 45.47 | Positive | 709.32922 | 560.79292 | 26.4 |
| AQS[+80.0]YDIQAWKK(+2) | 37.47 | 45.47 | Positive | 709.32922 | 773.46684 | 26.4 |
| AQS[+80.0]YDIQAWKK(+2) | 37.47 | 45.47 | Positive | 709.32922 | 888.49378 | 26.4 |
| AQS[+80.0]YDIQAWKK(+2) | 37.47 | 45.47 | Positive | 709.32922 | 1051.5571 | 26.4 |
| AQS[+80.0]YDIQAWKK (heavy)(+2) | 37.47 | 45.47 | Positive | 713.33632 | 564.80002 | 26.4 |
| AQS[+80.0]YDIQAWKK (heavy)(+2) | 37.47 | 45.47 | Positive | 713.33632 | 781.48103 | 26.4 |
| AQS[+80.0]YDIQAWKK (heavy)(+2) | 37.47 | 45.47 | Positive | 713.33632 | 896.50798 | 26.4 |
| AQS[+80.0]YDIQAWKK (heavy)(+2) | 37.47 | 45.47 | Positive | 713.33632 | 1059.5713 | 26.4 |
| SFS[+80.0]SPENFQR(+2) | 38.1 | 46.1 | Positive | 639.76117 | 391.16121 | 24 |
| SFS[+80.0]SPENFQR(+2) | 38.1 | 46.1 | Positive | 639.76117 | 473.7225 | 24 |
| SFS[+80.0]SPENFQR(+2) | 38.1 | 46.1 | Positive | 639.76117 | 790.38423 | 24 |
| SFS[+80.0]SPENFQR (heavy)(+2) | 38.1 | 46.1 | Positive | 644.7653 | 391.16121 | 24 |
| SFS[+80.0]SPENFQR (heavy)(+2) | 38.1 | 46.1 | Positive | 644.7653 | 478.72663 | 24 |
| SFS[+80.0]SPENFQR (heavy)(+2) | 38.1 | 46.1 | Positive | 644.7653 | 800.3925 | 24 |
| LHVS[+80.0]TINLQK(+2) | 38.63 | 46.63 | Positive | 616.82357 | 502.29837 | 25.4 |
| LHVS[+80.0]TINLQK(+2) | 38.63 | 46.63 | Positive | 616.82357 | 716.43012 | 25.4 |
| LHVS[+80.0]TINLQK(+2) | 38.63 | 46.63 | Positive | 616.82357 | 884.51999 | 25.4 |
| LHVS[+80.0]TINLQK (heavy)(+2) | 38.63 | 46.63 | Positive | 620.83067 | 510.31257 | 25.4 |
| LHVS[+80.0]TINLQK (heavy)(+2) | 38.63 | 46.63 | Positive | 620.83067 | 724.44431 | 25.4 |
| LHVS[+80.0]TINLQK (heavy)(+2) | 38.63 | 46.63 | Positive | 620.83067 | 892.53419 | 25.4 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR(+3) | 39.43 | 47.43 | Positive | 840.07813 | 738.38931 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR(+3) | 39.43 | 47.43 | Positive | 840.07813 | 821.42643 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR(+3) | 39.43 | 47.43 | Positive | 840.07813 | 1027.015 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR(+3) | 39.43 | 47.43 | Positive | 840.07813 | 1031.9889 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR (heavy)(+3) | 39.43 | 47.43 | Positive | 843.41422 | 748.39758 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR (heavy)(+3) | 39.43 | 47.43 | Positive | 843.41422 | 831.4347 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR (heavy)(+3) | 39.43 | 47.43 | Positive | 843.41422 | 1031.9889 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPSPR (heavy)(+3) | 39.43 | 47.43 | Positive | 843.41422 | 1032.0191 | 26.3 |
| VADPDHDHTGFLTEY[+80.0]VATR(+3) | 40.74 | 48.74 | Positive | 741.99507 | 596.75453 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR(+3) | 40.74 | 48.74 | Positive | 741.99507 | 689.30182 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR(+3) | 40.74 | 48.74 | Positive | 741.99507 | 818.34441 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR(+3) | 40.74 | 48.74 | Positive | 741.99507 | 919.39209 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR(+3) | 40.74 | 48.74 | Positive | 741.99507 | 974.90929 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 40.74 | 48.74 | Positive | 745.33116 | 596.75453 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 40.74 | 48.74 | Positive | 745.33116 | 699.31009 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 40.74 | 48.74 | Positive | 745.33116 | 828.35268 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 40.74 | 48.74 | Positive | 745.33116 | 929.40036 | 23.4 |
| VADPDHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 40.74 | 48.74 | Positive | 745.33116 | 974.90929 | 23.4 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 720.37875 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 799.90054 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 818.35564 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 821.42643 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 978.02651 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR(+3) | 41.47 | 49.47 | Positive | 840.07813 | 1027.015 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 730.38702 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 804.90467 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 828.36391 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 831.4347 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 983.03064 | 26.3 |
| QHEAPSNRPLNELLTPQGPS[+80.0]PR (heavy)(+3) | 41.47 | 49.47 | Positive | 843.41422 | 1032.0191 | 26.3 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 720.37875 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 818.35564 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 901.39276 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 1018.0097 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 1066.9981 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR(+3) | 41.68 | 49.68 | Positive | 866.73357 | 1115.026 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 730.38702 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 828.36391 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 911.40103 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 1023.0138 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 1072.0023 | 27.1 |
| QHEAPSNRPLNELLT[+80.0]PQGPS[+80.0]PR (heavy)(+3) | 41.68 | 49.68 | Positive | 870.06966 | 1115.026 | 27.1 |
| IADPEHDHTGFLTEY[+80.0]VATR(+3) | 42.05 | 50.05 | Positive | 751.33884 | 689.30182 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR(+3) | 42.05 | 50.05 | Positive | 751.33884 | 919.39209 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR(+3) | 42.05 | 50.05 | Positive | 751.33884 | 976.93056 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR(+3) | 42.05 | 50.05 | Positive | 751.33884 | 1034.444 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR(+3) | 42.05 | 50.05 | Positive | 751.33884 | 1039.4488 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 754.67493 | 699.31009 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 754.67493 | 929.40036 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 754.67493 | 981.93469 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 754.67493 | 1039.4482 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 754.67493 | 1039.4488 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 757.01398 | 699.31009 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 757.01398 | 929.40036 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 757.01398 | 985.44327 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 757.01398 | 1042.9567 | 23.7 |
| IADPEHDHTGFLTEY[+80.0]VATR (heavy)(+3) | 42.05 | 50.05 | Positive | 757.01398 | 1042.9574 | 23.7 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 43.16 | 51.16 | Positive | 768.65051 | 689.30182 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 43.16 | 51.16 | Positive | 768.65051 | 901.38152 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 43.16 | 51.16 | Positive | 768.65051 | 960.91745 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 43.16 | 51.16 | Positive | 768.65051 | 1388.623 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 43.16 | 51.16 | Positive | 771.9866 | 699.31009 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 43.16 | 51.16 | Positive | 771.9866 | 911.38979 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 43.16 | 51.16 | Positive | 771.9866 | 965.92158 | 24.2 |
| VADPDHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 43.16 | 51.16 | Positive | 771.9866 | 1388.623 | 24.2 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 44.39 | 52.39 | Positive | 777.99428 | 610.77018 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 44.39 | 52.39 | Positive | 777.99428 | 689.30182 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 44.39 | 52.39 | Positive | 777.99428 | 818.34441 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 44.39 | 52.39 | Positive | 777.99428 | 901.38152 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR(+3) | 44.39 | 52.39 | Positive | 777.99428 | 967.92527 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 781.33037 | 610.77018 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 781.33037 | 699.31009 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 781.33037 | 828.35268 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 781.33037 | 911.38979 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 781.33037 | 972.92941 | 24.5 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 783.66942 | 610.77018 | 23.7 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 783.66942 | 699.31009 | 23.7 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 783.66942 | 828.35268 | 23.7 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 783.66942 | 911.38979 | 23.7 |
| IADPEHDHTGFLT[+80.0]EY[+80.0]VATR (heavy)(+3) | 44.39 | 52.39 | Positive | 783.66942 | 976.43799 | 23.7 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR(+2) | 45.09 | 53.09 | Positive | 915.40298 | 531.74786 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR(+2) | 45.09 | 53.09 | Positive | 915.40298 | 670.34063 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR(+2) | 45.09 | 53.09 | Positive | 915.40298 | 805.40502 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR(+2) | 45.09 | 53.09 | Positive | 915.40298 | 1062.4884 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR(+2) | 45.09 | 53.09 | Positive | 915.40298 | 1244.594 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR (heavy)(+2) | 45.09 | 53.09 | Positive | 920.40712 | 536.75199 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR (heavy)(+2) | 45.09 | 53.09 | Positive | 920.40712 | 670.34063 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR (heavy)(+2) | 45.09 | 53.09 | Positive | 920.40712 | 815.41329 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR (heavy)(+2) | 45.09 | 53.09 | Positive | 920.40712 | 1072.4967 | 33.4 |
| LGTSES[+80.0]LPC[+57.0]TAEELSR (heavy)(+2) | 45.09 | 53.09 | Positive | 920.40712 | 1254.6022 | 33.4 |
| EVDYSDS[+80.0]LTEKQWLK(+3) | 45.83 | 53.83 | Positive | 640.95907 | 615.32987 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK(+3) | 45.83 | 53.83 | Positive | 640.95907 | 658.84588 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK(+3) | 45.83 | 53.83 | Positive | 640.95907 | 707.83433 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK(+3) | 45.83 | 53.83 | Positive | 640.95907 | 846.87947 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK(+3) | 45.83 | 53.83 | Positive | 640.95907 | 932.51999 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK (heavy)(+3) | 45.83 | 53.83 | Positive | 643.63047 | 619.33697 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK (heavy)(+3) | 45.83 | 53.83 | Positive | 643.63047 | 662.85298 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK (heavy)(+3) | 45.83 | 53.83 | Positive | 643.63047 | 711.84143 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK (heavy)(+3) | 45.83 | 53.83 | Positive | 643.63047 | 850.88657 | 20.4 |
| EVDYSDS[+80.0]LTEKQWLK (heavy)(+3) | 45.83 | 53.83 | Positive | 643.63047 | 940.53419 | 20.4 |
| GREFS[+80.0]FEAWNAK(+3) | 46.19 | 54.19 | Positive | 507.88892 | 353.66901 | 16.5 |
| GREFS[+80.0]FEAWNAK(+3) | 46.19 | 54.19 | Positive | 507.88892 | 418.1903 | 16.5 |
| GREFS[+80.0]FEAWNAK(+3) | 46.19 | 54.19 | Positive | 507.88892 | 518.27216 | 16.5 |
| GREFS[+80.0]FEAWNAK(+3) | 46.19 | 54.19 | Positive | 507.88892 | 589.30927 | 16.5 |
| GREFS[+80.0]FEAWNAK (heavy)(+3) | 46.19 | 54.19 | Positive | 510.56032 | 353.66901 | 16.5 |
| GREFS[+80.0]FEAWNAK (heavy)(+3) | 46.19 | 54.19 | Positive | 510.56032 | 418.1903 | 16.5 |
| GREFS[+80.0]FEAWNAK (heavy)(+3) | 46.19 | 54.19 | Positive | 510.56032 | 526.28636 | 16.5 |
| GREFS[+80.0]FEAWNAK (heavy)(+3) | 46.19 | 54.19 | Positive | 510.56032 | 597.32347 | 16.5 |
| VADPDHDHTGFLT[+80.0]EYVATR(+3) | 46.5 | 54.5 | Positive | 741.99507 | 609.33549 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR(+3) | 46.5 | 54.5 | Positive | 741.99507 | 738.37808 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR(+3) | 46.5 | 54.5 | Positive | 741.99507 | 821.41519 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR(+3) | 46.5 | 54.5 | Positive | 741.99507 | 1192.5018 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR(+3) | 46.5 | 54.5 | Positive | 741.99507 | 1388.623 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 46.5 | 54.5 | Positive | 745.33116 | 619.34376 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 46.5 | 54.5 | Positive | 745.33116 | 748.38635 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 46.5 | 54.5 | Positive | 745.33116 | 831.42346 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 46.5 | 54.5 | Positive | 745.33116 | 1192.5018 | 23.4 |
| VADPDHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 46.5 | 54.5 | Positive | 745.33116 | 1388.623 | 23.4 |
| IADPEHDHTGFLT[+80.0]EYVATR(+3) | 47.37 | 55.37 | Positive | 751.33884 | 610.77018 | 24.5 |
| IADPEHDHTGFLT[+80.0]EYVATR(+3) | 47.37 | 55.37 | Positive | 751.33884 | 738.37808 | 24.5 |
| IADPEHDHTGFLT[+80.0]EYVATR(+3) | 47.37 | 55.37 | Positive | 751.33884 | 821.41519 | 24.5 |
| IADPEHDHTGFLT[+80.0]EYVATR(+3) | 47.37 | 55.37 | Positive | 751.33884 | 927.94211 | 24.5 |
| IADPEHDHTGFLT[+80.0]EYVATR(+3) | 47.37 | 55.37 | Positive | 751.33884 | 976.93056 | 24.5 |
| IADPEHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 47.37 | 55.37 | Positive | 754.67493 | 610.77018 | 23.7 |
| IADPEHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 47.37 | 55.37 | Positive | 754.67493 | 748.38635 | 23.7 |
| IADPEHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 47.37 | 55.37 | Positive | 754.67493 | 831.42346 | 23.7 |
| IADPEHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 47.37 | 55.37 | Positive | 754.67493 | 932.94624 | 23.7 |
| IADPEHDHTGFLT[+80.0]EYVATR (heavy)(+3) | 47.37 | 55.37 | Positive | 754.67493 | 981.93469 | 23.7 |
| NYQSQADIPIRS[+80.0]PFGIVK(+3) | 51.07 | 59.07 | Positive | 705.02078 | 597.32575 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK(+3) | 51.07 | 59.07 | Positive | 705.02078 | 604.87933 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK(+3) | 51.07 | 59.07 | Positive | 705.02078 | 653.86778 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK(+3) | 51.07 | 59.07 | Positive | 705.02078 | 746.89981 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK(+3) | 51.07 | 59.07 | Positive | 705.02078 | 807.32677 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK (heavy)(+3) | 51.07 | 59.07 | Positive | 707.69218 | 601.33285 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK (heavy)(+3) | 51.07 | 59.07 | Positive | 707.69218 | 608.88643 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK (heavy)(+3) | 51.07 | 59.07 | Positive | 707.69218 | 657.87488 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK (heavy)(+3) | 51.07 | 59.07 | Positive | 707.69218 | 750.90691 | 22.3 |
| NYQSQADIPIRS[+80.0]PFGIVK (heavy)(+3) | 51.07 | 59.07 | Positive | 707.69218 | 807.32677 | 22.3 |
| ELFDDPSY[+80.0]VNVQNLDK(+2) | 52.52 | 60.52 | Positive | 988.43788 | 617.32532 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK(+2) | 52.52 | 60.52 | Positive | 988.43788 | 678.8134 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK(+2) | 52.52 | 60.52 | Positive | 988.43788 | 830.43666 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK(+2) | 52.52 | 60.52 | Positive | 988.43788 | 1172.5347 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK(+2) | 52.52 | 60.52 | Positive | 988.43788 | 1356.6195 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK (heavy)(+2) | 52.52 | 60.52 | Positive | 992.44498 | 625.33952 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK (heavy)(+2) | 52.52 | 60.52 | Positive | 992.44498 | 682.8205 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK (heavy)(+2) | 52.52 | 60.52 | Positive | 992.44498 | 838.45086 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK (heavy)(+2) | 52.52 | 60.52 | Positive | 992.44498 | 1180.5489 | 35.9 |
| ELFDDPSY[+80.0]VNVQNLDK (heavy)(+2) | 52.52 | 60.52 | Positive | 992.44498 | 1364.6337 | 35.9 |
| ASGQAFELILS[+80.0]PR(+2) | 55.34 | 63.34 | Positive | 734.86342 | 454.27724 | 27.3 |
| ASGQAFELILS[+80.0]PR(+2) | 55.34 | 63.34 | Positive | 734.86342 | 567.36131 | 27.3 |
| ASGQAFELILS[+80.0]PR(+2) | 55.34 | 63.34 | Positive | 734.86342 | 680.44537 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 739.86756 | 464.28551 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 739.86756 | 577.36958 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 739.86756 | 690.45364 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 743.37614 | 464.28551 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 743.37614 | 577.36958 | 27.3 |
| ASGQAFELILS[+80.0]PR (heavy)(+2) | 55.34 | 63.34 | Positive | 743.37614 | 697.4708 | 27.3 |
| GPS[+80.0]WDPFRDWYPHSR(+3) | 55.37 | 63.37 | Positive | 661.61598 | 496.26266 | 21 |
| GPS[+80.0]WDPFRDWYPHSR(+3) | 55.37 | 63.37 | Positive | 661.61598 | 525.20922 | 21 |
| GPS[+80.0]WDPFRDWYPHSR(+3) | 55.37 | 63.37 | Positive | 661.61598 | 680.8309 | 21 |
| GPS[+80.0]WDPFRDWYPHSR(+3) | 55.37 | 63.37 | Positive | 661.61598 | 831.38403 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 664.95207 | 506.27093 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 664.95207 | 525.20922 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 664.95207 | 685.83504 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 664.95207 | 836.38817 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 668.28815 | 506.27093 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 668.28815 | 525.20922 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 668.28815 | 690.83917 | 21 |
| GPS[+80.0]WDPFRDWYPHSR (heavy)(+3) | 55.37 | 63.37 | Positive | 668.28815 | 841.3923 | 21 |