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Courses » Mass spectrometry based proteomics

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# Unit 3 - Week 2: Basics of mass spectrometry



## Course outline

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**Week 1: Proteomics introduction and sample preparation**

**Week 2: Basics of mass spectrometry**

- Lecture 6: Chromatography technologies
- Lecture 7: Liquid chromatography
- Lecture 8: Mass spectrometry: Ionization sources
- Lecture 9: Mass spectrometry: Mass analyzers
- Lecture 10: MALDI sample preparation and analysis
- Lab session 2.1: Sample preparation: tissue sample preservation technology
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**Week 3: Quantitative proteomics**

## Assignment-II

The due date for submitting this assignment has passed. **Due on 2016-04-06, 05:29 IST.** As per our records you have not submitted this assignment.

Amino acid sequencing is essential to identify the proteins. Which of the following method could be used for N-terminal sequencing of the protein? **0.5 points**

- Sanger method
- Edman reaction
- Mass spectrometry
- All of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*All of the above*

2) Protein sample preparation is one of the most crucial steps of any proteomic experiment. What is meant by good protein sample preparation? **0.5 points**

- Protein without nucleic acids and hence reproducible data across replicates
- Protein contents devoid of salt and other artifacts
- High-quality protein contents alongwith metabolites
- Both A & B

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Protein without nucleic acids and hence reproducible data across replicates*

3) Protein solubilization is an important step in proteomic experiment and many detergents are used to maximize the solubility. At the same time, many of these detergents affect the downstream experiments. Which of the following detergent can NOT be used for protein solubilisation in 2DE/offgel fractionation experiments? **0.5 points**

- Sodium lauryl sulfate
- CHAPS
- NP-40
- None of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Sodium lauryl sulfate*

4) Extraction of major biomolecules such as Protein, DNA and RNA from same sample is always best to obtain –omics profile. Trizol reagent is often used for simultaneous extraction of DNA, RNA and protein from same sample in a single step. What is the composition of TRIzol? **0.5 points**

- Phenol
- Guanidium-isothiocyanate
- Both A & B
- Ethanol

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Both A & B*

5) There are many solvent based protein extraction methods available in literature for proteomic experiment. What advantage does Trizol extraction offers over acetone precipitation? **0.5 points**

- RNA, DNA and protein can be extracted from the same sample
- RNA molecules remains intact as the nuclease are inactivated
- Lipid contaminants are removed from the protein sample
- All of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*All of the above*

6) Many chromatographic technologies are available to fractionate or clean-up the protein sample. Which chromatographic principle is involved in the process of zip-tipping of samples during sample preparation? **0.5 points**

- Affinity chromatography
- Ion-exchange chromatography
- Reverse phase chromatography
- Gel-filtration chromatography

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Reverse phase chromatography*

7) In the process of Zip-tipping, many solvents are used to clean-up the peptide sample before injecting into mass spectrometer. Which of the following solution is used to remove the salts from the protein sample? **0.5 points**

- 100% Acetonitrile
- 50% Acetonitrile
- 0.1% Trifluoroacetic acid
- All of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*0.1% Trifluoroacetic acid*

8) Many organic solvents are routinely used for protein precipitation to remove the salts. Which of the following organic solvent can be used for protein precipitation? **0.5 points**

- Acetone
- Ethanol
- Acetonitrile
- All of the above

**No, the answer is incorrect.**

**Score: 0**



**Accepted Answers:***Acetone*

9) Which of the following resin is not the part of an ion-exchange chromatography?

**0.5 points**

- C18
- CM Cellulose
- C5
- Both A & C

**No, the answer is incorrect.****Score: 0****Accepted Answers:***Both A & C*

10) Which of the following chromatography is directly compatible with ESI mass spectrometry for protein analysis?

**0.5 points**

- SCX
- Reverse phase
- Gel-filtration
- All of the above

**No, the answer is incorrect.****Score: 0****Accepted Answers:***Reverse phase*

11) Mass analyzer is an important part of the mass spectrometry to resolve the ions based on m/z. Which one of the following is NOT a mass analyzer?

**0.5 points**

- TOF
- Quadrupole
- ESI
- Ion-trap

**No, the answer is incorrect.****Score: 0****Accepted Answers:***ESI*

12) Disulphide bonds are the covalent interactions in protein, which can affect the MS/MS data while searching the Mascot database. Which of the following chemical is used to block cysteine during protein digestion?

**0.5 points**

- Iodoacetamide
- TCEP
- Methyl methanethiosulfonate
- Both A & B

**No, the answer is incorrect.****Score: 0****Accepted Answers:***Both A & B*

13) Membrane proteins are hard to extract and also difficult to separate. Which of the following chromatography could be used for the separation of membrane proteins?

**0.5 points**

- Anion exchange chromatography
- Reverse phase chromatography
- Cation exchange chromatography
- Gel filtration chromatography

**No, the answer is incorrect.****Score: 0**

**Accepted Answers:***Reverse phase chromatography*

14) A single peptide was subjected to MALDI-TOF/TOF and ESI-QTOF. The parent ion position in the MS spectrum obtained from both the instruments **0.5 points**

- The parent ion lies on extreme left-hand-side in the MS/MS spectrum in case of MALDI-TOF/TOF, where as it lies on extreme right hand side in case of ESI-QTOF
- Parent ion could be identified at any m/z in case of MALDI-TOF/TOF analysis, whereas the parent ion lies on extreme right hand side on the MS/MS spectrum in case of ESI-QTOF analysis
- In both cases the parent ion observed at the same m/z value in the MS/MS spectrum
- Parent ion could be identified on extreme right hand side in the MS/MS spectrum in case of MALDI-TOF/TOF analysis, whereas it could be observed at any m/z value in case of ESI-QTOF analysis

**No, the answer is incorrect.****Score: 0****Accepted Answers:***Parent ion could be identified on extreme right hand side in the MS/MS spectrum in case of MALDI-TOF/TOF analysis, whereas it could be observed at any m/z value in case of ESI-QTOF analysis*

15) Which one of the following is an ionization source? **0.5 points**

- APCI
- Ion-trap
- FT-ICR
- All of the above

**No, the answer is incorrect.****Score: 0****Accepted Answers:***APCI*

16) Wide range of tandem mass spectrometry platforms are in practice for discovery proteomics. To validate the specific target proteins, targeted proteomics has emerged. Which of the following tandem mass spectrometry is widely used for targeted proteomics experiment to validate the protein? **0.5 points**

- TOF-TOF
- QQQ
- Q-Orbitrap
- QTOF

**No, the answer is incorrect.****Score: 0****Accepted Answers:***QQQ*

17) Why quadrupoles are most prominent mass analyzers in targeted proteomics? **0.5 points**

- High selectivity
- High resolution
- High sensitivity
- All of the above

**No, the answer is incorrect.****Score: 0****Accepted Answers:***High selectivity*

18) Retention time is an important parameter in targeted proteomics. Which of the following component of the LC-MS/MS would provide retention time? **0.5 points**

- MS
- MS/MS
- LC
- All of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*LC*

19) Ionization efficiency is a very important factor to provide sufficient ions to generate spectra. **0.5 points**  
Which of the following factors affect the ionization efficiency?

- Polarity of the compound
- Solvent volatility
- Surface tension and population of ions
- All of the above

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*All of the above*

20) The heat stabilization techniques such as Denator Stabilizer System could be used for? **0.5 points**

- Preserving the phosphorylation sites
- Extraction of protein
- Identification of proteins
- Resolving the proteins

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Preserving the phosphorylation sites*



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