Questions – Chapter 01

1- Who is considered as the “father” of mass spectrometry?

□ Thomson □ Tanaka □ Watson □ Makarov

2- What amino acid(s) could be phosphorylated?

□ Glycine □ Serine □ Threonine □ Tryptophan

3- What is typical of protein secondary structure?

□ Disulfide bridges □ β-sheet □ α-helix □ Hydrophobic interactions

4- What amino acid(s) present a charged side chain?

□ Arginine □ Lysine □ Glycine □ Leucine

5- What is single-letter code for glycine, arginine, and lysine?

□ G, R, L □ G, A, K □ G, R, K □ Y, A, N

6- What is the heavier amino acid?

□ Glycine □ Leucine □ Tryptophan □ isoleucine

7- When was the Orbitrap analyzer invented?

□ 1910 □ 1953 □ 2000 □ 2015

8- What is the SI unit of mass?

□ Dalton [Da] □ Unified atomic mass [u] □ Thomson [Th] □ Dimensionless

9- What is the nominal mass of insulin ($C_{257}H_{383}N_{65}O_{77}S_6$)?

□ 5801 u □ 5797 u □ 5803.638 u □ 5899.621 u

10- What is the charge state of a positive ion with its isotopic peaks separated by 0.25?

□ $z = 1$ □ $z = 2$ □ $z = 3$ □ $z = 4$

11- A mass spectrometer achieves an accuracy of 5 ppm. What is the Δm in Da at $m/z = 1000$?

□ 0.001 Da □ 0.002 Da □ 0.005 Da □ 0.01 Da

12- What is ESI?

□ An analyzer □ A detector □ An ionization method □ None of those

13- The ESI spectrum of a protein gives a charge state envelope. What is charge state of my peak m_1 at m/z = 1199.08 knowing that the next peak of lower charge is m_2 at m/z = 1332.20?

□ $z_1 = 8$ □ $z_1 = 9$ □ $z_1 = 10$ □ $z_1 = 8$

14- From question #13, what is the average molecular mass of this protein?

□ 11980.81 Da □ 12580.76 Da □ 14960.23 Da □ 10279.67 Da

15- What flow rate is typical of the micro-spray mode?

□ 10 µL/min □ 300 nL/min □ 1 µL/min □ 1 nL/min

16- What does MALDI stand for?

□ Matrix-assisted laser desorption/ionization □ Metal-assisted laser desorption/ionization □ Metal-assisted light desorption/ionization □ Matrix-assisted light dissolution/ionization

17- What mass analyzer can offer the best resolution?

□ Quadrupole □ TOF □ FTICR □ Orbitrap

18- In an Orbitrap, the ions are trapped in an …?

□ Magnetic field □ Electrostatic field □ Ions are not trapped □ Ions fly

19- In a TOF analyzer, m/z is proportional to?

□ t □ $1/t$ □ d □ None of these

20- In what type(s) of mass spectrometer can be performed MS/MS in time?

□ Q-TOF □ QqQ □ Ion trap □ FTICR

21. What type(s) of ions are generated with collision-induced dissociation?

□ b □ a □ z □ y