2. The marine natural product maitotoxin has a molecular formula C_{164}H_{256}O_{68}S_{2}Na_{2}. In the negative ion FAB mass spectrum, maitotoxin shows a peak associated with loss of a sodium cation Na^+ to give the [C_{164}H_{256}O_{68}S_{2}Na]^− anion. (In the negative ion mode, anions are observed, rather than cations.) (10 points)

a. What is the m/z ratio of the [^{12}C_{164}^{1}H_{256}^{16}O_{68}^{32}S_{2}^{23}Na]^{−} isotopomer of the [C_{164}H_{256}O_{68}S_{2}Na]^{−} ion? __________________

Please show you work below.

b. What is the isotopic composition of the predominant isotopomer of the [C_{164}H_{256}O_{68}S_{2}Na]^{−} ion?

______________________________

If you are uncertain among a couple of possibilities, explain below.

c. What is the formula of the cation that would you expect to observe in the positive ion ESI mass spectrum of maitotoxin? ____________________________

d. What is the m/z ratio of the {^{12}C, ^{1}H, ^{16}O, ^{32}S, ^{23}Na} isotopomer of that cation? ____________________

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