**Unit 6: Moles & Math**

**Free Response Review**

**Directions:** The suggested time is about 15 minutes for answering the constructed response section of the chemistry test.  The parts within a question may not have equal weight. For calculations, show all your work in the spaces provided after each part. Pay particular attention to the proper use of units.  Be sure your final answer is rounded to the correct number of significant figures.  Make sure your work is legible. Illegible work will receive a grade of zero.

**Question 1 [10 POINTS]**

Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar, C12H22O11) when dissolved in water. It is marketed as NutraSweet. The molecular formula for aspartame is C14H18N2O5.

* 1. One packet of aspartame contains 35.0 mg of C14H18N2O5.
     1. Show a numerical setup using dimensional analysis and determine how many moles of aspartame are present in each packet. **[2 POINTS]**

35.0mg x=.0350g

1.19x10-4mols

* + 1. Show a numerical setup using dimensional analysis and determine how many molecules of aspartame are present in each packet. **[1 POINT]**

7.16x1019mlc

* + 1. Show a numerical setup using dimensional analysis and determine how many atoms of nitrogen are present in each packet. **[1 POINT]**

1.43x1020 atom N

* + 1. Show a numerical setup using dimensional analysis and calculate how many grams of sugar you would need to equal the sweetness of one packet of aspartame. **[2 POINTS]**

35.0mg x=.0350gx160=5.6g

* 1. What is the percent by mass of carbon in:
     1. aspartame? **[1 POINT]**

Mm of aspartame is 294.307

* + 1. sucrose? **[1 POINT]**

Mm of sucrose=342.297

* 1. One morning, Ms. Lestik uses one packet of aspartame in her morning coffee. The next morning, she uses 3.90 g of sucrose instead. Is the number of molecules of sucrose used greater than, equal to, or less than the number of molecules of aspartame used? Show a numerical setup using dimensional analysis to justify your response. **[2 POINTS]**

.035g of aspartame= 7.16x1019mlc (from problem A ii)

3.90g of sucrose = 6.86x1021mlc

There are more mlc of sucrose.

Just a side note. You can just cover both to moles since the one with the more moles will have the greater number of mlc.