Name:_____

Mole Problems #2

1. The MOLE is a key concept in chemistry.
a. Define the term 'mole.'
b. What is Avogadro's number?
c. What is the relationship between the *molecular mass* and the *molar mass* of a compound?

2. Aspartame ("Nutrasweet" or "Equal") is an artificial sweetener (sugar substitute). Its molecular formula is $C_{14}H_{18}N_2O_5$. What is the mass of 0.842 mol of Aspartame?

3. How many moles are present in 65.7 g of Aspartame?

4. What is the mass of 1.25×10^{20} molecules of Caffeine ($C_8H_{10}N_4O_2$)?

5. About 25 μg of tetrahydrocannabinol (T.H.C.), the active ingredient in marijuana, is required to induce intoxication. Its molecular formula is $C_{21}H_{30}O_2$. How many moles does 25 μg of T.H.C. represent?

6. How many molecules are present in 25 μg of T.H.C.?

7. What would be the mass of 3.0×10^{22} molecules of cholesterol ($C_{27}H_{46}O$)?

8. How many molecules in a 500.0 mg tablet of Vitamin C (Ascorbic Acid) ($C_6H_8O_6$)?

9. How many carbon atoms are present in a 100.0 mg tablet of Paracetamol (Acetominophen) ($C_8H_9O_2N$), the active ingredient in Tylenol?

10. How many hydrogen atoms would be found in 28.0 mg of Pentylacetate ($CH_3CO_2C_5H_{11}$), the compound that causes the odour in bananas?

11. A sample of the female sex hormone Estradiol (estrogen) ($C_{18}H_{24}O_2$) contains 1.0×10^{20} atoms of hydrogen. How many molecules of Estradiol would it contain?

12. How many moles of Estradiol are represented by the answer to Question #11?

13. How many moles are present in 5.08 g of Benzoic Acid ($C_7H_6O_2$), a food preservative?

14. What would be the volume of 5.0 mol of Cl_2 gas at STP?

15. What volume would 4.0×10^{24} molecules of F_2 gas occupy at STP?

16. How many hydrogen atoms are present in one molecule of Ammonium sulfate?