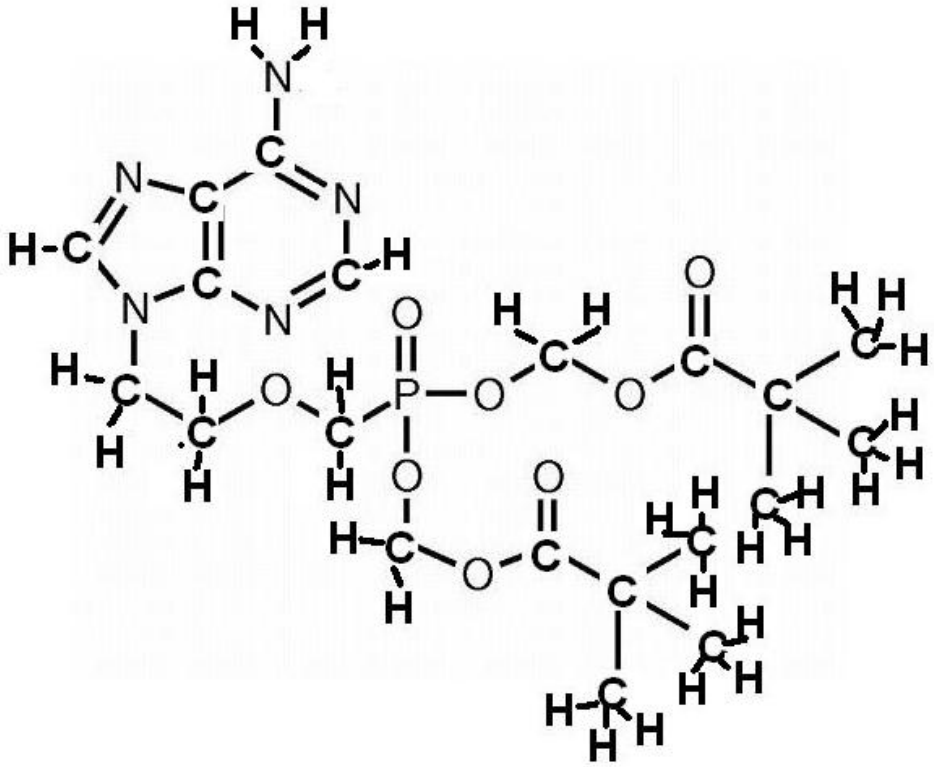

This is a figure showing the locations of hydrogen (H), oxygen (O), carbon (C) , nitrogen (N) and phosphorus (P) atoms in one molecule of adefovir dipivoxil, which is a drug designed to treat hepatitis B.

**Problem 1** - How many atoms of each element are present in one molecule of tannic acid?

**Problem 2** - Write the molecular formula of this molecule by filling-in the blanks with the number of counted atoms in the following:

C__ H__ N__O__P__

**Problem 3** – The mass of each element is given in terms of Atomic Mass Units (AMUs). If the masses of the atoms in adefovir dipivoxil are H = 1 AMU, C=12 AMU, N= 14 AMU, O=16 AMU, and P = 31 AMU, what is the total mass of a single molecule in AMUs?

**Problem 4** - If 1 AMU equals 1.7 x $10^{-27}$ kilograms, how many molecules are present in a sample with a mass of 1 microgram?

**Problem 1** - How many atoms of each element are present in one molecule of tannic acid?

Answer: **Carbon (C) = 20**
**Oxygen (O) = 8**
**Hydrogen (H) = 32**
**Nitrogen (N) = 5**
**Phosporus (P) = 1**

**Problem 2** - Write the molecular formula of this molecule by filling-in the blanks with the number of counted atoms in the following:

$$C_{20}\ H_{32}\ N_5\ O_8\ P$$

**Problem 3** – The mass of each element is given in terms of Atomic Mass Units (AMUs). If the masses of the atoms in adefovir dipivoxil are H = 1 AMU, C=12 AMU, N= 14 AMU, O=16 AMU, and P = 31 AMU, what is the total mass of a single molecule in AMUs?

Answer: M = 20(12) + 32(1) + 5(14) + 8(16) + 1(31) = **501 AMU.**

**Problem 4** - If 1 AMU equals $1.7 \times 10^{-27}$ kilograms, how many molecules are present in a sample with a mass of 1 microgram?

Answer: One molecule has a mass of 501 AMU x ($1.7 \times 10^{-27}$ km/1 AMU) = $8.5 \times 10^{-25}$ kg. The sample has a total mass of $1.0 \times 10^{-6}$ grams which equals $1.0 \times 10^{-9}$ kilograms.

So the number of molecules is N = $1.0 \times 10^{-9}$ /$8.5 \times 10^{-25}$ = **$1.2 \times 10^{15}$ molecules**.