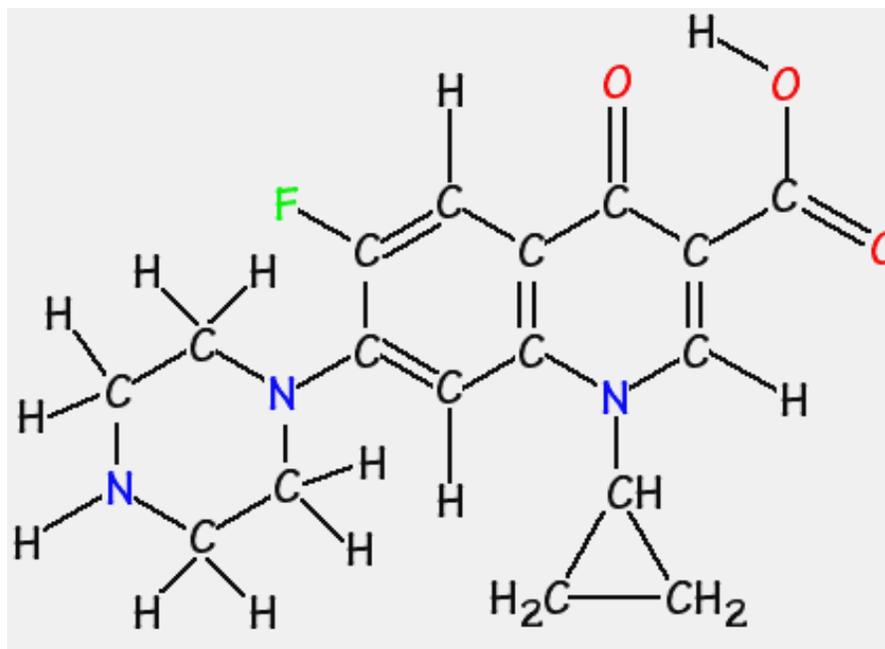


An Atom Counting Exercise

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This is a figure showing the locations of hydrogen (H), oxygen (O), carbon (C), nitrogen (N) and fluorine (F) atoms in one molecule of ciprofloxacin. This man-made compound kills bacteria such as anthrax by interfering with the enzymes that cause DNA in the anthrax bacterium to rewind after being copied, which stops DNA and protein synthesis.

Problem 1 - How many atoms of each element are present in one molecule of ciprofloxacin? (Note H₂ means 2 atoms of H)

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



Problem 3 – The mass of each element is given in terms of Atomic Mass Units (AMUs). If the masses of the atoms in ciprofloxacin are H = 1 AMU, C=12 AMU, O=16 AMU, N = 14 AMU and F = 19 AMU, what is the total mass of the ciprofloxacin molecule in units of AMUs?

Problem 1 - How many atoms of each element are present in one molecule of ciprofloxacin?

Answer: **Carbon (C) = 17 atoms**
Hydrogen (H) = 18 atoms
Oxygen (O) = 3 atoms
Fluorine (F) = 1
Nitrogen (N) = 3

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



Problem 3 – The mass of each element is given in terms of Atomic Mass Units (AMUs). If the masses of the atoms in ciprofloxacin are H = 1 AMU, C=12 AMU, O=16 AMU, N = 14 AMU and F = 19 AMU, what is the total mass of the ciprofloxacin molecule in units of AMUs?

Answer: From the count of the numbers of atoms of each kind:

$$M = 17(12) + 18(1) + 1(19) + 3(14) + 3(16)$$

$$M = \mathbf{331 \text{ AMU.}}$$