CHEMISTRY 133
Spring, 2015 Homework Set 3.1 Additional Problem 1
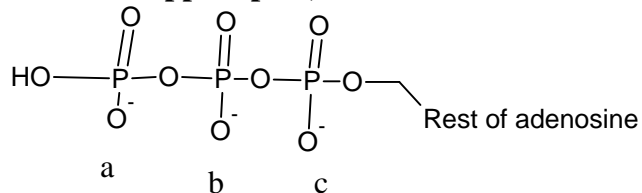
In a 4.70 Tesla field, the magnetogyric ratios (γ) for ^{31}P is 1.08 x 10^8 T^{-1} s^{-1}.
Equations and constants you might need: ν (frequency) = ($\gamma/2\pi$)H   (H = magnetic field strength)
a) At what frequency (in MHz) does ^{31}P absorb light?
b) If the peaks from two closest (spectrally) phosphorous atoms in ATP (see structure below) are
located 4.5 ppm apart, what is their difference in Hz?

c) Given that ^{31}P (the only natural P isotope) has a I = ½, what type of splitting would be seen for each P atom in ATP if splitting can only be observed if across two or fewer bonds. Assume that any OH protons exchange too rapidly to allow splitting.