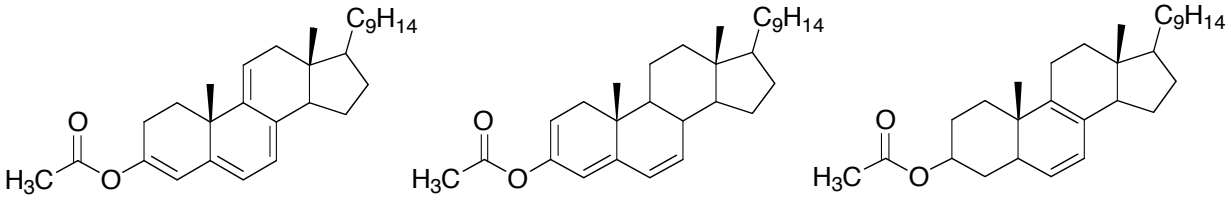
Name:_____

(1) (10 pts) The ultraviolet spectrum of benzonitrile shows a primary absorption band at 224 nm and a secondary band at 271 nm. The spectrum is obtained in a 1 cm pathlength cuvette.

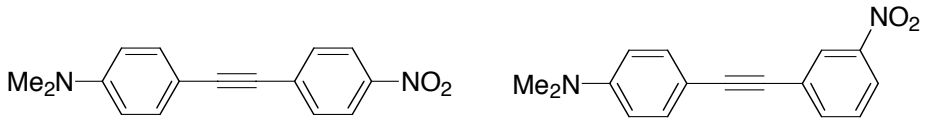
(a) a solution of benzonitrile in water with a 0.1 mmolar concentration is examined at a wavelength of 224 nm. The absorbance is determined to be A = 1.30 What is the molar absorptivity of this band

(b) if the same solution is examined at 271 nm, what will be the absorbance reading, assuming that ε = 1000 for this band?

(2) (10 pts) Match the steroid structures shown below to the following values of the UV-vis band maximum in hexane: A = 275 nm, B = 304 nm, C = 356 nm. Use both qualitative arguments, Woodward's rule predictions, and/or specific comparison spectral information that you have available. If you cite comparison spectra, you must give your literature reference or WWW URL.



(3) (10 pts) Structure P below shows a very strong UV-vis maximum peak shift going from nonpolar to polar solvents, while M shows a modest shift. Give a brief explanation for this different behavior.



P **M**

(4) (15 pts) for the hypothetical MO diagram shown below (molecule with C2v symmetry), work out the proper symmetry designation for the states formed by $2b_2$ to $3b_2$, $1b_1$ to $3b_2$, and $1a_2$ to $3b_2$ excitations. Which of these is/are symmetry allowed, and which symmetry forbidden? Show your work, using your group tables.