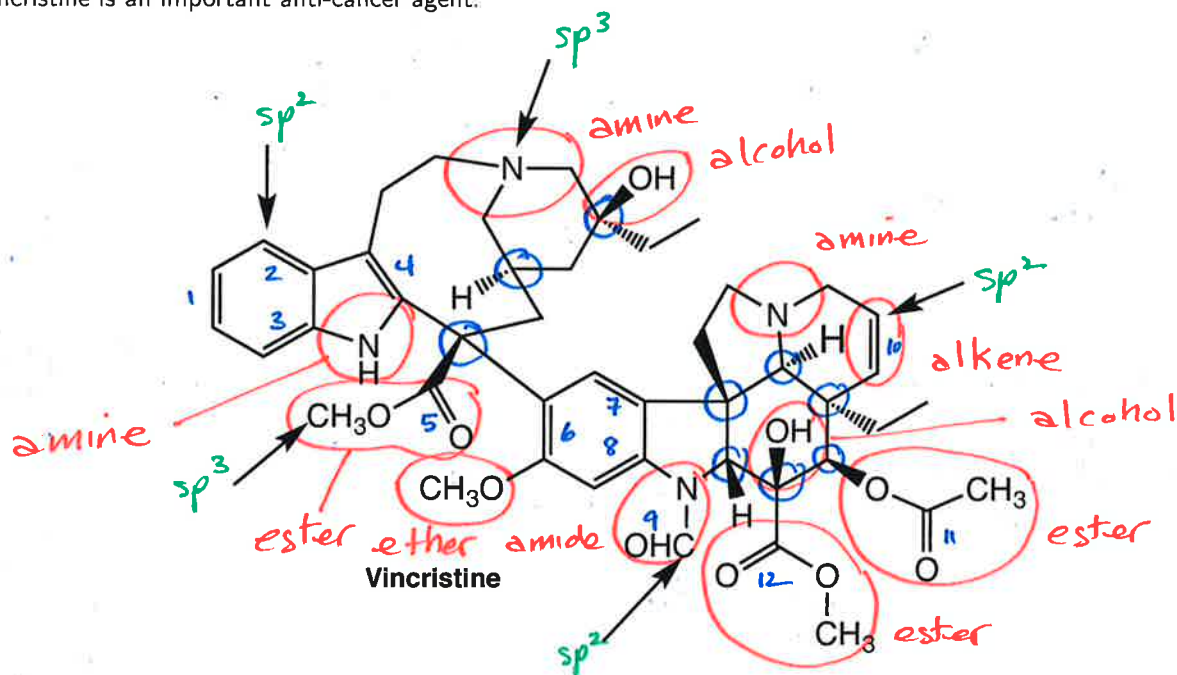


KEY

Study Question Zero: Important Skills & Concepts from Chemistry 120 & 240

If you have trouble with these problems, please review your organic and/or biomolecules texts and then ask questions! There is a copy of Karty on reserve in Prevo Science for your convenience.

1. Vincristine is an important anti-cancer agent.



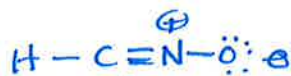
- (a) Circle and categorize all the functional groups in vincristine.
 (b) Give the hybridization of the atoms marked with an arrow.
 (c) How many π bonds are present in vincristine? 12 (#ed)
 (d) How many chiral centers are present in vincristine? 9 (circled)

2. Fill in the following table:

name	bond angle	hybridization	max σ bonds	max π bonds
tetrahedral	109.5	sp^3	4	0
trigonal planar	120	sp^2	3	1
linear	180	sp	2	2

3. Draw one Lewis structure for each formula below. Show all lone pairs and formal charges on the atoms that bear them.

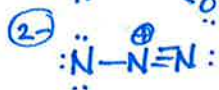
(a) HCNO



(b) HCO₂H



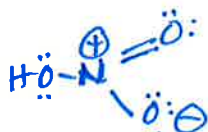
(c) N₃⁻



(d) HCCH

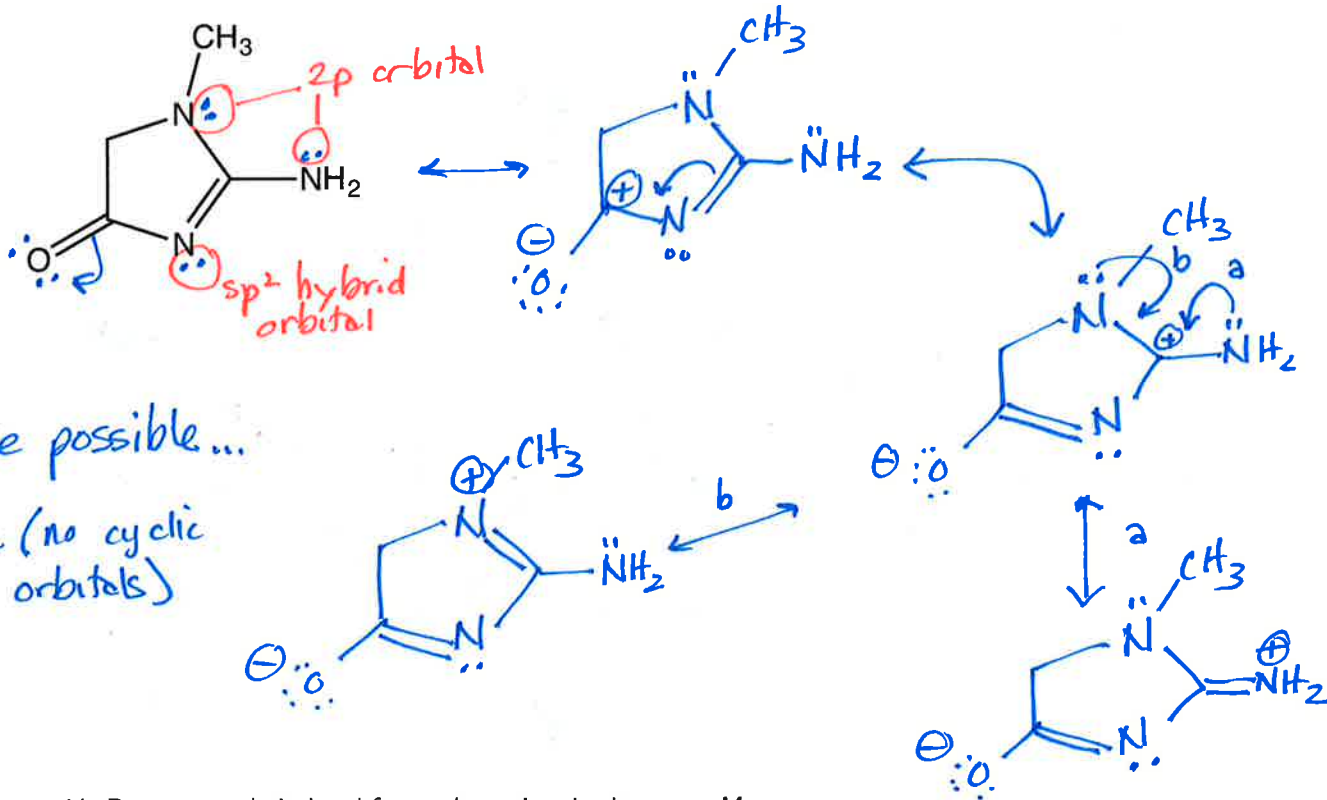


(e) HNO₃

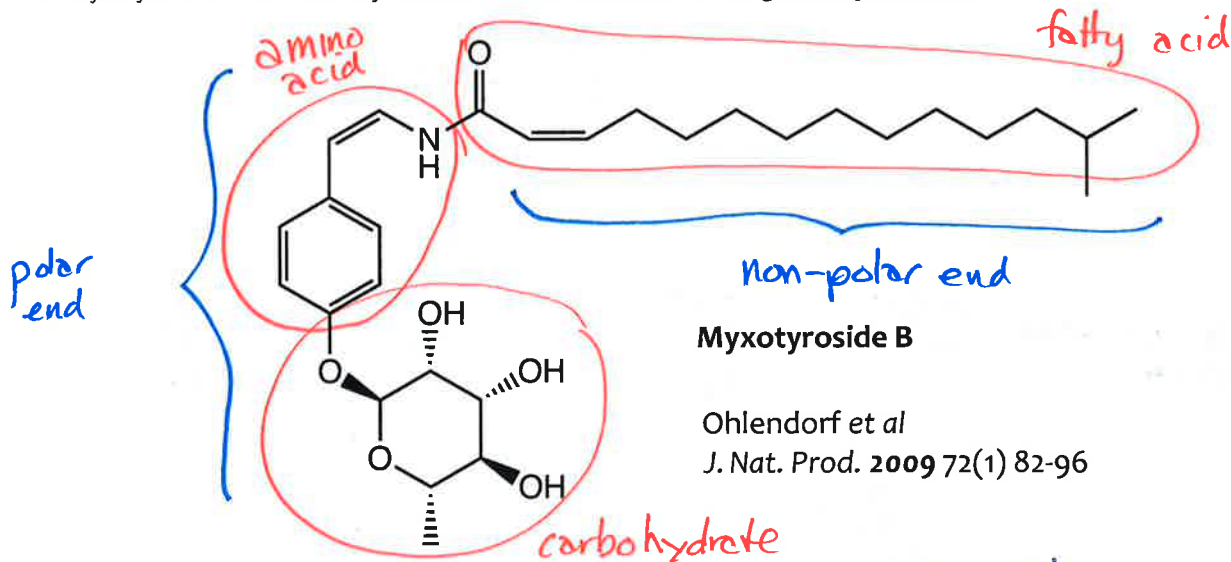


all but (d) have other possibilities

4. Creatinine is an important molecule in metabolism; its level in urine is a good clinical measure of renal function. Begin by adding any missing lone pairs to the structure given. Then draw four additional important resonance forms for creatinine. Is creatinine aromatic? Why or why not? In what orbitals do the nitrogen lone pairs reside?



5. Myxotyroside B was recently isolated from a bacterium in the genus *Myxococcus*.



- (a) Comment on the probable solubility behavior of this compound. *amphipathic*
- (b) How many stereoisomers are possible for this compound? *2⁷ (5 chiral centers + 2 alkenes)*
- (c) What categories of biomolecules are apparently used to create myxotyroside B? Circle portions of the molecule and comment on their likely origins. Note: you might want to consult Chapter 2 of McBeg and you'll have to be a bit imaginative.