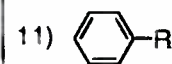
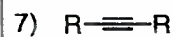
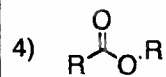
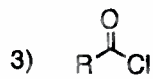
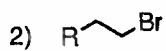
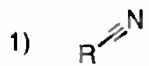


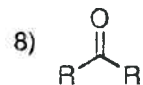
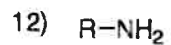
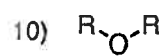
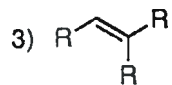
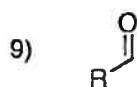
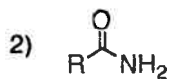
Down



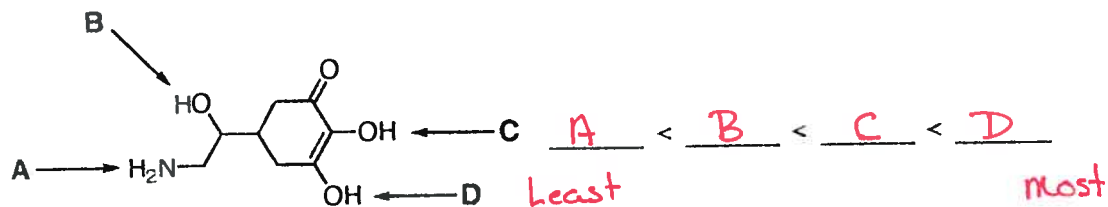
Handwritten crossword puzzle grid with chemical terms filled in:

- 1) NITRILE
- 2) ALKYL
- 3) AMIDE
- 4) ESTER
- 5) ALCOHOL
- 6) ALKANE
- 7) ALKYL
- 8) KETONE
- 9) ALDEHYDE
- 10) ETHER
- 11) PHENYL
- 12) AMINE
- 13) SULFIDE

Across



2. On the structure shown below, rank hydrogens A-D in INCREASING order of acid strength (weakest → strongest).



Please justify your groups answer in the space below. Feel free to use words, figures and structures in your answer. Note: a complete answer will discuss each indicated hydrogen (A-D) and what effects are relevant to its acidic properties. Use ONLY the space provided below do not this exceed the area.

A)  $\text{HN}^{\ominus}-\text{R}$  less stable than neg on oxygen

B)  $\text{O}^{\ominus}-\text{R}$  more stable than A due to electroneg difference  
No Resonance forms

C) Two Resonance forms

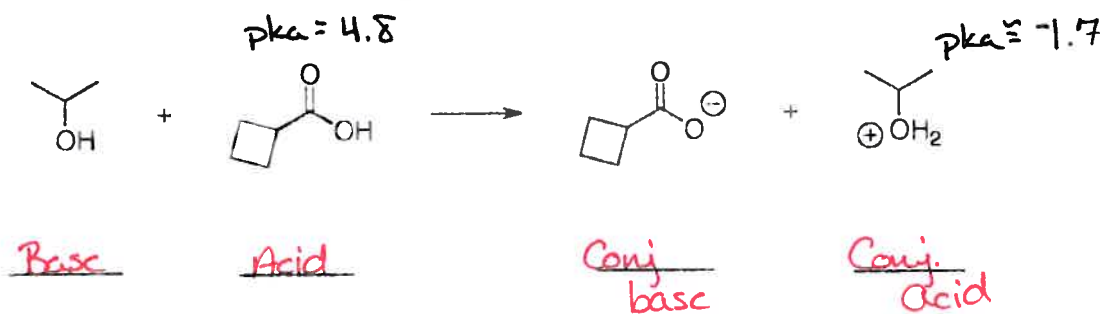


D) Three Resonance forms



3. For the acid-base reaction below, please answer the following questions:

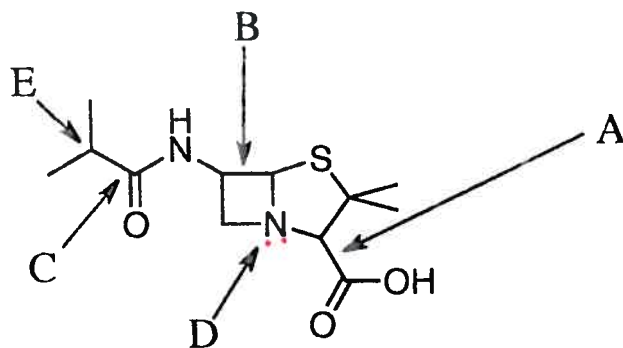
(a) label the following species: • acid • base • conjugate acid • conjugate base



(b) using your notes, which side (reactants or products) will be favored?

Reactants

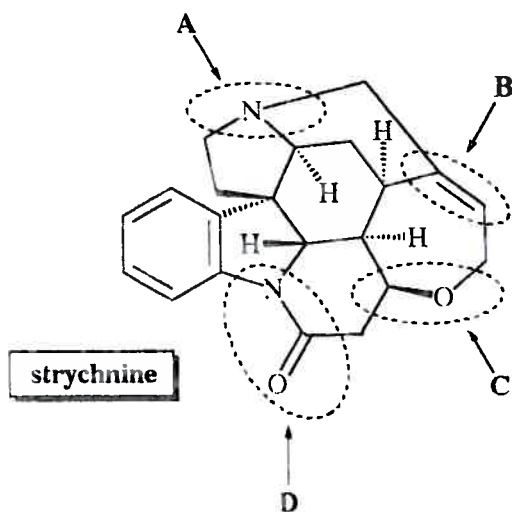
4. Shown below is the structure of the penicillin. Please answer the following questions about the make up of the chemical structure.



- What orbitals are used to form bond A:
- What orbitals are used to form bond B:
- What is the hybridization of atom C:
- What is the hybridization of atom D:
- How many hydrogen(s) around atom E:

$C_{sp^2}-C_{sp^3}$   
 $C_{sp^3}-C_{sp^3}$   
 $sp^2$   
 $sp^3$   
1

5. Identify the highlighted functional groups in the organic compound shown below. Strychnine is my favorite organic molecule!!!



A Amine  
B Alkene  
C Ether  
D Amide

6. Identify the following as either a nucleophile or electrophile.

