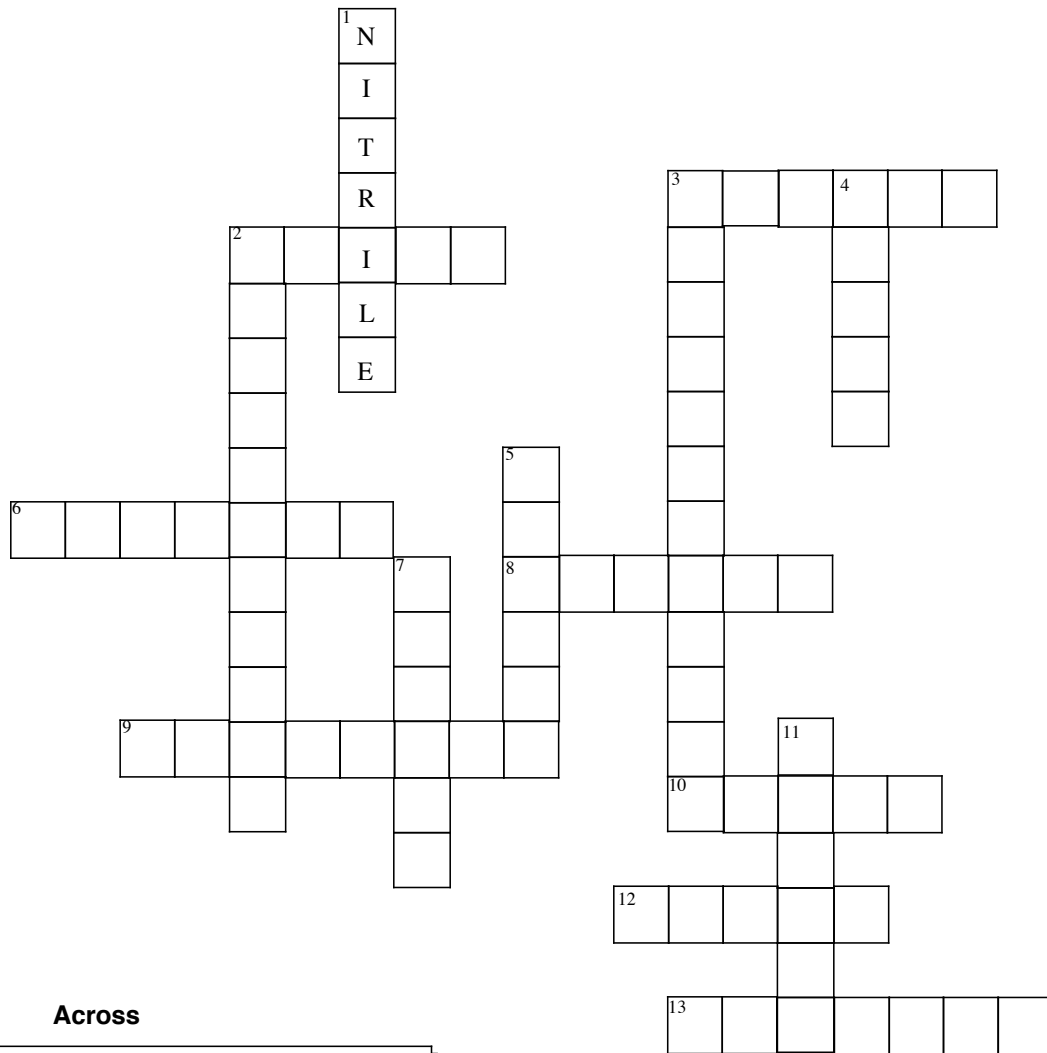
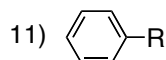
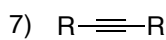
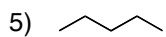
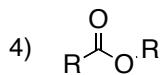
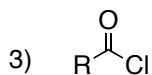
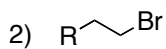
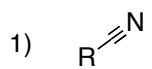
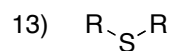
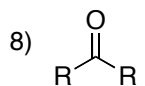
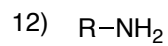
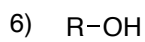
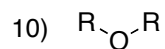
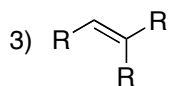
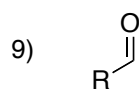
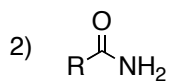


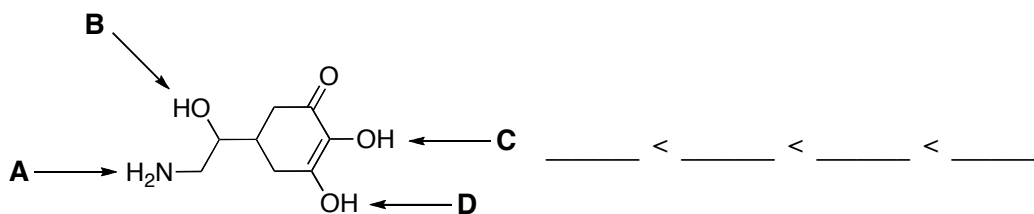
**Down**



**Across**



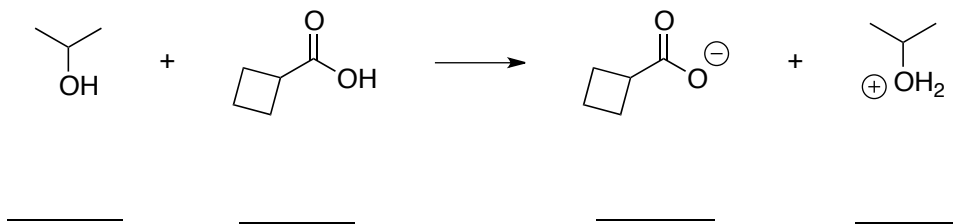
2. On the structure shown below, rank hydrogens A-D in INCREASING order of acid strength (weakest → strongest).



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.

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

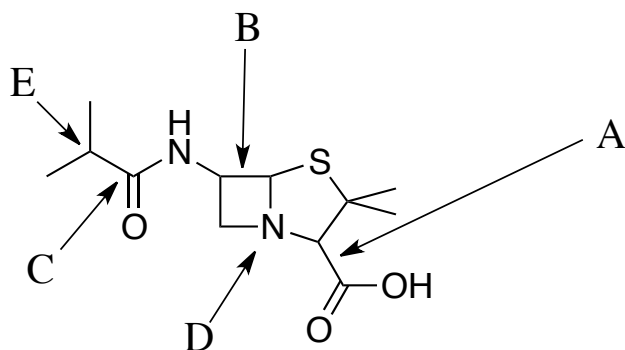
(a) label the following species:    • acid    • base    • conjugate acid    • conjugate base



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

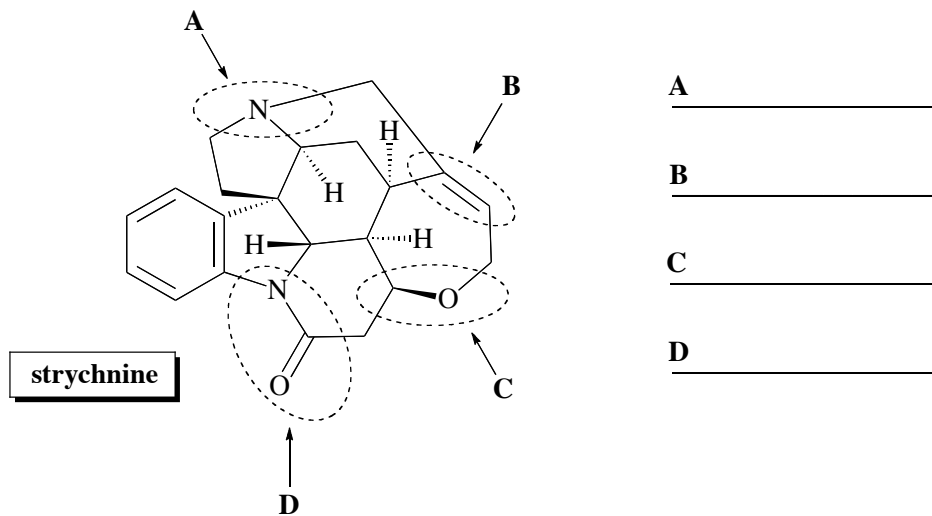
\_\_\_\_\_

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**: \_\_\_\_\_

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



- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

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

