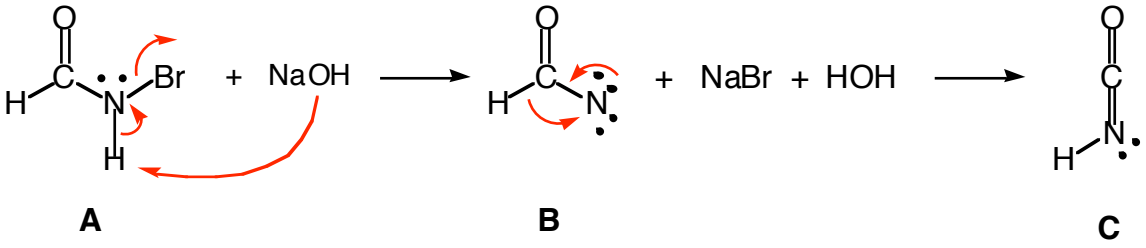
PROBLEMS ON VSEPR THEORY

1. When molecule **A** is reacted with a base such as NaOH, product **C** is formed. Scientists have found that **A** must turn into **B** before it can become **C**. In the near future, we will learn what the curved arrows mean. For now, your assignment is to draw an accurate orbital picture (in 3D) for each molecule (**A**-**C**). Label all bond angles and indicate the hybridization of the nitrogen in each molecule.



A **B** **C**

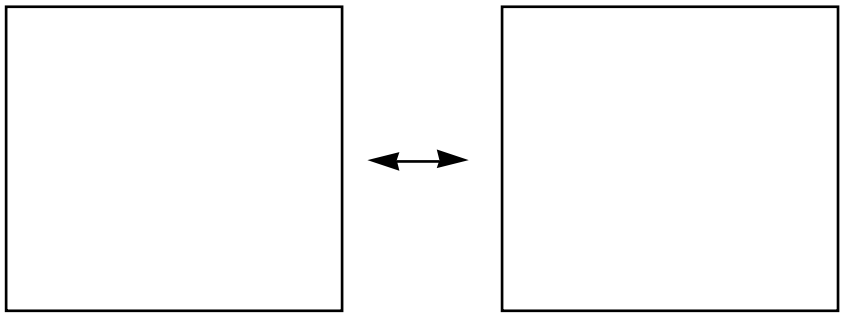
A

B

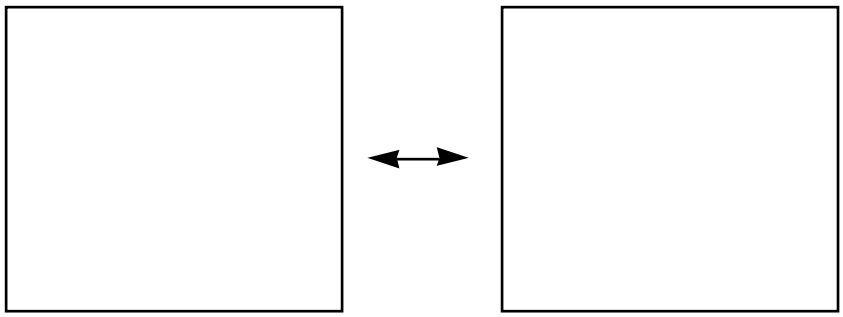
C

2. Draw the Lewis structure of H_2O_2 in the box provided. Using VESPR theory, draw the most stable orbital picture for the molecule. Remember to approximate a 3-D drawing as best you can. Explain why the picture you drew is the most stable (you can do so by drawing one of the less stable possibilities).

3. Draw the Lewis structures of $(CH_3)_2CO$ and $(CH_3)_2SO$ in the boxes provided. Be sure to show all nonbonded electrons and indicated any charges that may exist. In the boxes to the right, draw the major resonance contributors for each molecule (again, indicating any nonbonded electrons or charges). Use your knowledge of orbitals and bonding to answer the questions that follow.



$(CH_3)_2CO$ **resonance contributor**



$(CH_3)_2SO$ **resonance contributor**

(a) Do these two molecules have the same geometry? Give a brief description of each.

(b) What is the hybridization of the central carbon in $(CH_3)_2CO$? What is the hybridization of the sulfur in $(CH_3)_2SO$?

(c) Will the central carbon atom in $(CH_3)_2CO$ most likely be attracted to a Lewis base or a Lewis acid? Why?