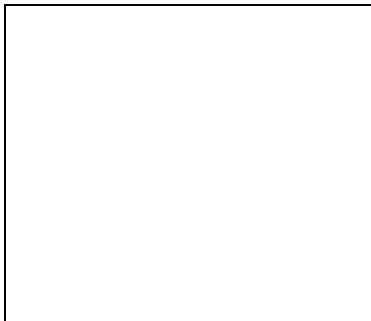


## 2005 AP<sup>®</sup> CHEMISTRY FREE-RESPONSE QUESTIONS

6. Answer the following questions that relate to chemical bonding.

- (a) In the boxes provided, draw the complete Lewis structure (electron-dot diagram) for each of the three molecules represented below.

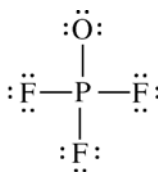


- (b) On the basis of the Lewis structures drawn above, answer the following questions about the particular molecule indicated.

- (i) What is the  $\text{F}-\text{C}-\text{F}$  bond angle in  $\text{CF}_4$  ?
  - (ii) What is the hybridization of the valence orbitals of  $\text{P}$  in  $\text{PF}_5$  ?
  - (iii) What is the geometric shape formed by the atoms in  $\text{SF}_4$  ?
- (c) Two Lewis structures can be drawn for the  $\text{OPF}_3$  molecule, as shown below.



Structure 1



Structure 2

- (i) How many sigma bonds and how many pi bonds are in structure 1 ?
- (ii) Which one of the two structures best represents a molecule of  $\text{OPF}_3$  ? Justify your answer in terms of formal charge.