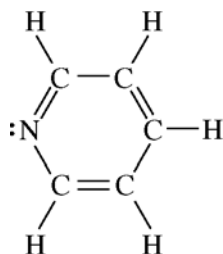


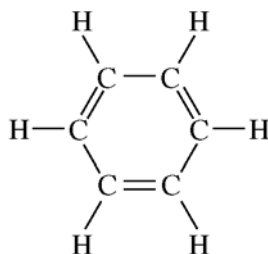
**2008 AP<sup>®</sup> CHEMISTRY FREE-RESPONSE QUESTIONS**

6. Answer the following questions by using principles of molecular structure and intermolecular forces.

- (a) Structures of the pyridine molecule and the benzene molecule are shown below. Pyridine is soluble in water, whereas benzene is not soluble in water. Account for the difference in solubility. You must discuss both of the substances in your answer.

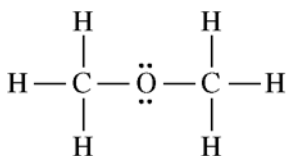


Pyridine

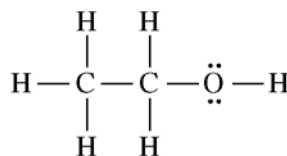


Benzene

- (b) Structures of the dimethyl ether molecule and the ethanol molecule are shown below. The normal boiling point of dimethyl ether is 250 K, whereas the normal boiling point of ethanol is 351 K. Account for the difference in boiling points. You must discuss both of the substances in your answer.



Dimethyl Ether



Ethanol

- (c)  $\text{SO}_2$  melts at 201 K, whereas  $\text{SiO}_2$  melts at 1,883 K. Account for the difference in melting points. You must discuss both of the substances in your answer.
- (d) The normal boiling point of  $\text{Cl}_2(l)$  (238 K) is higher than the normal boiling point of  $\text{HCl}(l)$  (188 K). Account for the difference in normal boiling points based on the types of intermolecular forces in the substances. You must discuss both of the substances in your answer.

**STOP**

**END OF EXAM**