

2009 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS

6. Answer the following questions related to sulfur and one of its compounds.

- (a) Consider the two chemical species S and S^{2-} .
- (i) Write the electron configuration (e.g., $1s^2 2s^2 \dots$) of each species.
 - (ii) Explain why the radius of the S^{2-} ion is larger than the radius of the S atom.
 - (iii) Which of the two species would be attracted into a magnetic field? Explain.
- (b) The S^{2-} ion is isoelectronic with the Ar atom. From which species, S^{2-} or Ar, is it easier to remove an electron? Explain.
- (c) In the H_2S molecule, the H–S–H bond angle is close to 90° . On the basis of this information, which atomic orbitals of the S atom are involved in bonding with the H atoms?
- (d) Two types of intermolecular forces present in liquid H_2S are London (dispersion) forces and dipole-dipole forces.
- (i) Compare the strength of the London (dispersion) forces in liquid H_2S to the strength of the London (dispersion) forces in liquid H_2O . Explain.
 - (ii) Compare the strength of the dipole-dipole forces in liquid H_2S to the strength of the dipole-dipole forces in liquid H_2O . Explain.

STOP

END OF EXAM