Answer EITHER Question 7 below OR Question 8 printed on page 14. Only one of these two questions will be graded. If you start both questions, be sure to cross out the question you do not want graded. The Section II score weighting for the question you choose is 15 percent.

7. Answer the following questions about the structures of ions that contain only sulfur and fluorine.

(a) The compounds SF_4 and BF_3 react to form an ionic compound according to the following equation.

$$SF_4 + BF_3 \rightarrow SF_3BF_4$$

(i) Draw a complete Lewis structure for the SF_3^+ cation in SF_3BF_4.

(ii) Identify the type of hybridization exhibited by sulfur in the SF_3^+ cation.

(iii) Identify the geometry of the SF_3^+ cation that is consistent with the Lewis structure drawn in part (a)(i).

(iv) Predict whether the F–S–F bond angle in the SF_3^+ cation is larger than, equal to, or smaller than 109.5°. Justify your answer.

(b) The compounds SF_4 and CsF react to form an ionic compound according to the following equation.

$$SF_4 + CsF \rightarrow CsSF_5$$

(i) Draw a complete Lewis structure for the SF_5^- anion in $CsSF_5$.

(ii) Identify the type of hybridization exhibited by sulfur in the SF_5^- anion.

(iii) Identify the geometry of the SF_5^- anion that is consistent with the Lewis structure drawn in part (b)(i).

(iv) Identify the oxidation number of sulfur in the compound $CsSF_5$.