

3.091 Fall Term 2004
Homework Quiz #4B
 Solution outline

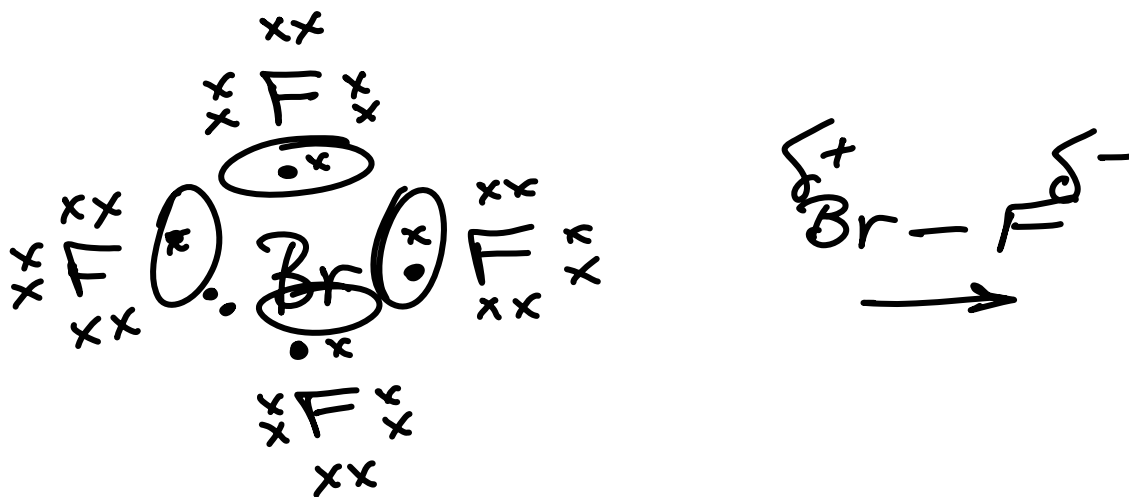
Answer the following questions about the tetrafluorobromate ion (BrF_4^+).

- (1) draw the Lewis structure
- (2) circle all bonding orbitals
- (3) indicate the polarity of the Br – F bond
- (4) state whether the molecule is polar or nonpolar
- (5) calculate the bond energy of the Br – F bond

Bond Energies (kJ/mol): Br–Br 195; F–F 160; C–C 350; H–H 435.

- (1), (2), (3)

BrF_4^+



- (4) molecule is polar – note asymmetric electron distribution around Br
 (5) use the Pauling formula to calculate bond energies

$$E_{\text{Br-F}} = \sqrt{E_{\text{Br-Br}} \times E_{\text{F-F}}} + 96.3(\chi_{\text{Br}} - \chi_{\text{F}})^2 = \sqrt{195 \times 160} + 96.3(2.96 - 3.98)^2 = 277 \text{ kJ/mol}$$