3.091 Fall Term 2009

Homework Quiz #3A

solution outline

(a) Write the reaction that defines the electron affinity of beryllium (Be).

$Be_{(g)} + e^- = Be^-_{(g)}$

(b) Do you expect the value of the electron affinity of Be to be positive or negative? Explain by referring to electronic structure.

expect EA of Be to be **positive**, since Be has the electronic structure $2s^2$ and is 6 electrons shy of noble gas octet stability and therefore would not profit by acquiring one more electron.

(c) Which of the following two compounds has the higher boiling point: BeF_2 or $BeCl_2$? Explain by referring to the relevant chemical bonding.

expect BeF_2 to have the higher bp. Both are ionic compounds since they consist of a strongly electropositive element, Be, and a strongly electronegative element, F or Cl. But the ionic radius of Cl^- is larger than that of F^-, so the coulombic force of attraction between Be^{2+} and Cl^- is expected to weaker than that between Be^{2+} and F^-. Hence, the compound with the stronger ionic bond, BeF_2, will have the higher bp.