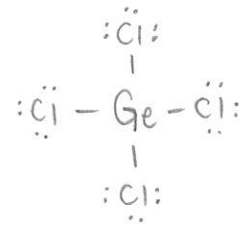
Quiz Free Response Practice #1

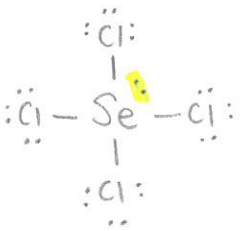
1. Consider the four covalent compound $GeCl_4$, $SeCl_4$, ICl_4^-, and ICl_4^+.

   a. Draw the Lewis structure (electron-dot diagram) of each of the four covalent species in the boxes provided below. Show all valence electrons in your structures. (4 points)

$GeCl_4$

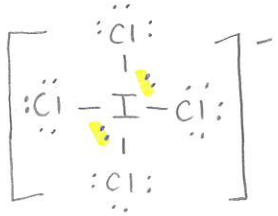


$SeCl_4$



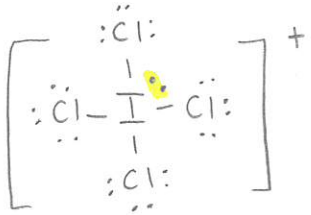
6 - 4 = 2

ICl_4^-



7 - 4 = 3 + 1 = 4

ICl_4^+



7 - 4 = 3 - 2 = 1

   b. On the basis of the Lewis structures drawn in part (a), answer the following questions.

      i. Identify the Cl–I–Cl bond angle in ICl_4^-.

      ii. What is the hybridization of the Ge atom in $GeCl_4$?

      iii. What is the geometric shape formed by the atoms in ICl_4^+?

      iv. How many sigma bonds and how many pi bonds are in the ICl_4^- structure?

      v. Is $SeCl_4$ polar? Explain.

i) 90°

ii) sp^3

iii) see-saw

iv) 4 σ, 0 π

v) Yes! The lone pair causes uneven (or asymmetric) distribution of e⁻ density around the $SeCl_4$ molecule.