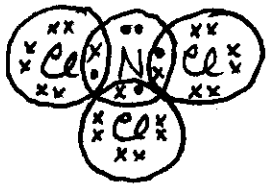
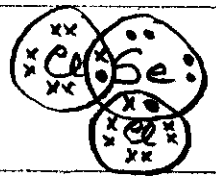
Worksheet: Ionic Versus Covalent Bonding

In each case, determine if an ionic or covalent compound will form. For ionic bonding show the transfer of <u>all</u> electrons and the resulting ions. For covalent cases, state how many electrons each atom needs to complete its octet and then draw the covalent compound. In both cases draw in any extra atoms that are needed.

cov. 1. $\cdot\ddot{N}\cdot$ + $\times\underset{\times\times}{Cl}\times$ ⇒  three single bonds NCl_3

ΔEN = 3.16 - 3.04 = 0.12; needs 3; needs 1; ∴ ×3

cov. 2. $\cdot\ddot{Se}\cdot$ + $\times\underset{\times\times}{Cl}\times$ ⇒  two single bonds $SeCl_2$

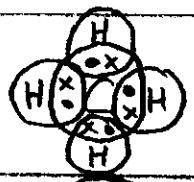
ΔEN = 3.16 - 2.55 = 0.61; needs 2; needs 1; ×2

ionic 3. $K\cdot$ + $\cdot\underset{\times\times}{F}\times$ ⇒ $[K]^{1+}$ $\left[\ddot{F}\right]^{1-}$ KF

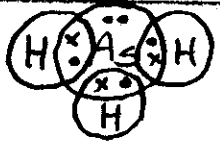
ΔEN = 3.98 - 0.82 = 2.16

ionic 4. Ba + $\times\underset{\times\times}{Cl}\times$ + $\times\underset{\times\times}{Cl}\times$ ⇒ $\left[\ddot{Cl}\right]^{1-}$ $[Ba]^{2+}$ $\left[\ddot{Cl}\right]^{1-}$ $BaCl_2$

ΔEN = 3.16 - 0.89 = 2.27

cov 5. $\cdot\dot{C}\cdot$ + H ⇒  four single bonds CH_4

ΔEN = 2.55 - 2.20 = 0.35; needs 4; needs 1; ×4

cov 6. $\cdot\ddot{As}\cdot$ + H ⇒  three single bonds AsH_3

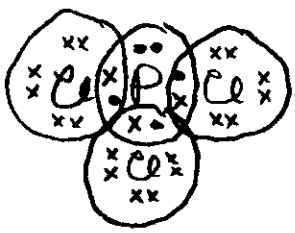
ΔEN = 2.20 - 2.18 = 0.02; needs 3; need 1; ∴ ×3

ionic 7. $Sr\cdot$ + $\cdot\underset{\times\times}{Br}\times$ ⇒ $\left[\ddot{Br}\right]^{1-}$ $[Sr]^{2+}$ $\left[\ddot{Br}\right]^{1-}$ $SrBr_2$

ΔEN = 2.96 - 0.95 = 2.01

ionic 8. $Cs\cdot$ + $\cdot\underset{\times\times}{O}\times$ + $\cdot Cs$ ⇒ $[Cs]^{1+}$ $\left[\ddot{O}\right]^{2-}$ $[Cs]^{1+}$ Cs_2O

ΔEN = 3.44 - 0.79 = 2.65

cov. 9. $\cdot\ddot{P}\cdot$ + $\times\underset{\times\times}{Cl}\times$ ⇒  three single bonds PCl_3

ΔEN = 3.16 - 2.19 = 0.97; needs 3; need 1; ∴ ×3