

Worksheet: Ionic Versus Covalent Bonding

In each case, determine if an ionic or covalent compound will form. For ionic bonding show the transfer of all 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.

1. N Cl

2. Se Cl

3. K F

4. Ba Cl

5. C H

6. As H

7. Sr Br

8. Cs O

9. P Cl

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cov. 1. N Cl

$$\begin{aligned}\Delta EN &= 3.16 - 3.04 \\ &= 0.12\end{aligned}$$

cov. 2. Se Cl

$$\begin{aligned}\Delta EN &= 3.16 - 2.55 \\ &= 0.61\end{aligned}$$

ionic 3. K F

$$\begin{aligned}\Delta EN &= 3.98 - 0.82 \\ &= 2.16\end{aligned}$$

ionic 4. Ba Cl

$$\begin{aligned}\Delta EN &= 3.16 - 0.89 \\ &= 2.27\end{aligned}$$

cov. 5. C H

$$\begin{aligned}\Delta EN &= 2.55 - 2.20 \\ &= 0.35\end{aligned}$$

cov. 6. As H

$$\begin{aligned}\Delta EN &= 2.20 - 2.18 \\ &= 0.02\end{aligned}$$

ionic 7. Sr Br

$$\begin{aligned}\Delta EN &= 2.96 - 0.95 \\ &= 2.01\end{aligned}$$

ionic 8. Cs O

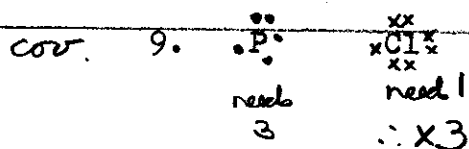
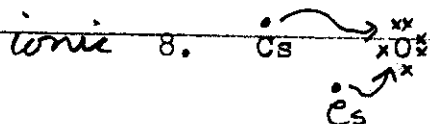
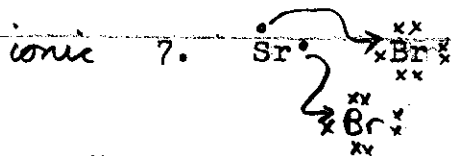
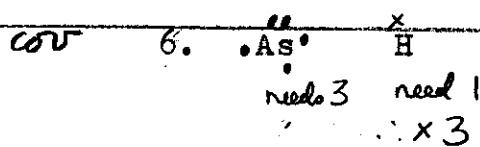
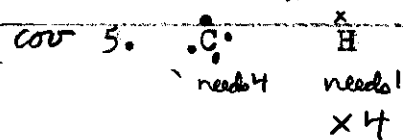
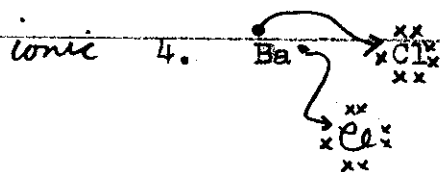
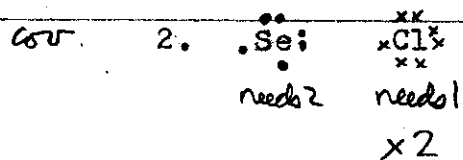
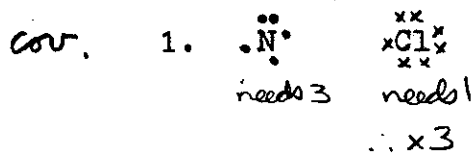
$$\begin{aligned}\Delta EN &= 3.44 - 0.79 \\ &= 2.65\end{aligned}$$

cov. 9. P Cl

$$\begin{aligned}\Delta EN &= 3.16 - 2.19 \\ &= 0.97\end{aligned}$$

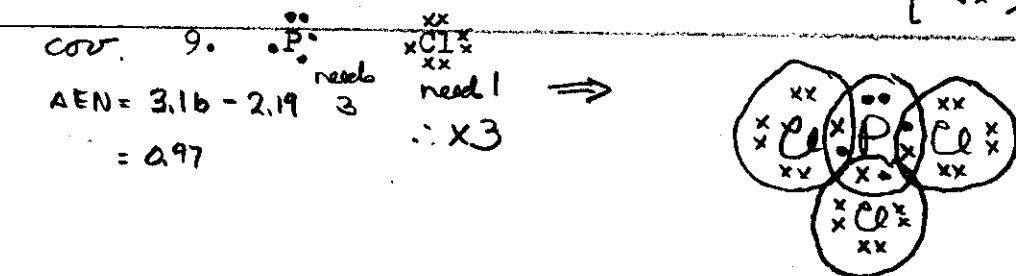
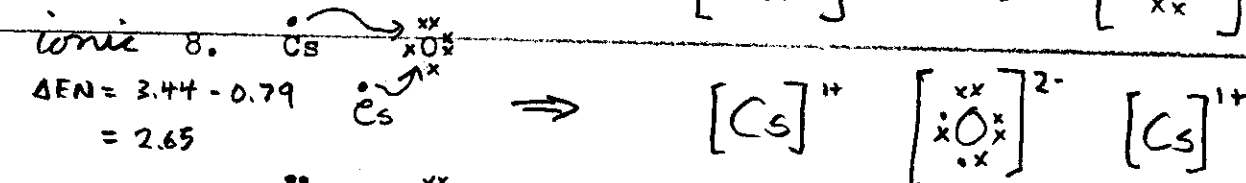
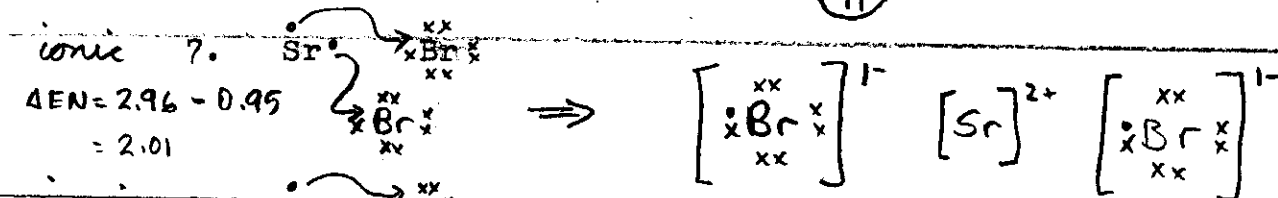
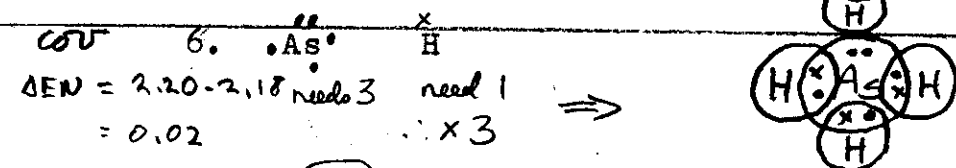
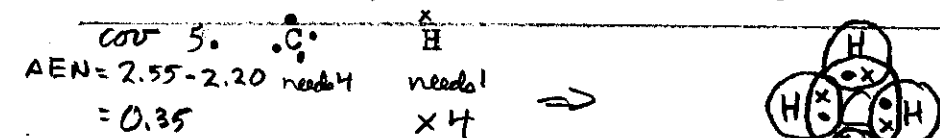
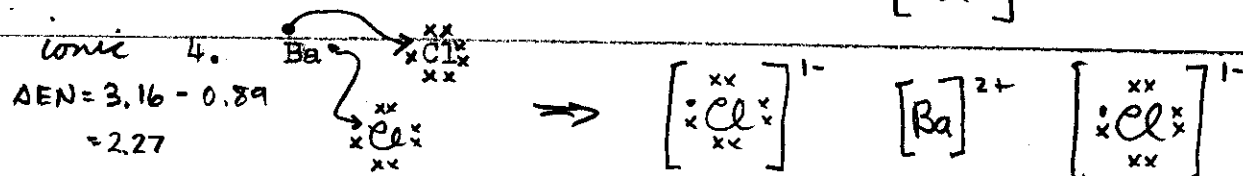
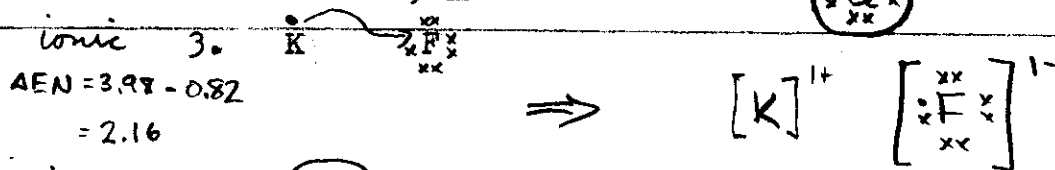
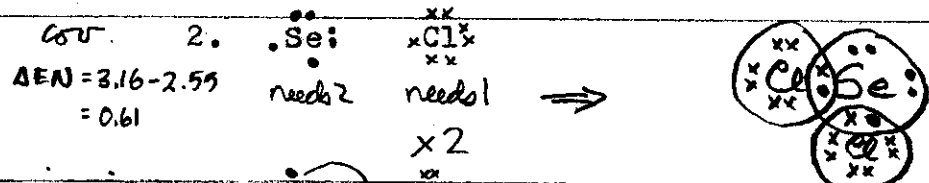
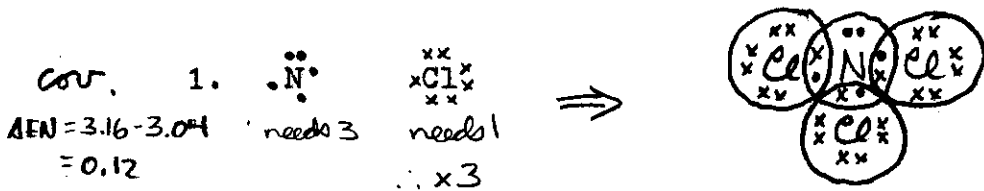
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cov.	1.	$\cdot\ddot{N}\cdot$ needs 3	$\begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ needs 1 $\therefore \times 3$	$\Rightarrow$		three single bonds	$\text{NO}_3$
cov.	2.	$\cdot\ddot{\text{Se}}\cdot$ needs 2	$\begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ needs 1 $\times 2$	$\Rightarrow$		two single bonds	$\text{SeCl}_2$
ionic	3.	$\text{K}$	$\begin{array}{c} \times\times \\ \times\text{F}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$	$\Rightarrow$	$[\text{K}]^{1+} \quad \left[ \begin{array}{c} \times\times \\ \times\text{F}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{1-}$		$\text{KF}$
ionic	4.	$\text{Ba}$	$\begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ $\begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$	$\Rightarrow$	$\left[ \begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{1-} \quad [\text{Ba}]^{2+} \quad \left[ \begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{1-}$		$\text{BaCl}_2$
cov.	5.	$\cdot\ddot{\text{C}}\cdot$ needs 4	$\begin{array}{c} \text{H} \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \end{array}$ needs 1 $\times 4$	$\Rightarrow$		four single bonds	$\text{CH}_4$
cov.	6.	$\cdot\ddot{\text{As}}\cdot$ needs 3	$\begin{array}{c} \text{H} \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \\ \times \end{array}$ needs 1 $\times 3$	$\Rightarrow$		three single bonds	$\text{AsH}_3$
ionic	7.	$\text{Sr}$	$\begin{array}{c} \times\times \\ \times\text{Br}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ $\begin{array}{c} \times\times \\ \times\text{Br}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$	$\Rightarrow$	$\left[ \begin{array}{c} \times\times \\ \times\text{Br}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{1-} \quad [\text{Sr}]^{2+} \quad \left[ \begin{array}{c} \times\times \\ \times\text{Br}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{1-}$		$\text{SrBr}_2$
ionic	8.	$\text{Cs}$	$\begin{array}{c} \times\times \\ \times\text{O}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ $\begin{array}{c} \times\times \\ \times\text{O}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$	$\Rightarrow$	$[\text{Cs}]^{1+} \quad \left[ \begin{array}{c} \times\times \\ \times\text{O}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array} \right]^{2-} \quad [\text{Cs}]^{1+}$		$\text{Cs}_2\text{O}$
cov.	9.	$\cdot\ddot{\text{P}}\cdot$ needs 3	$\begin{array}{c} \times\times \\ \times\text{Cl}\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \\ \times\times \end{array}$ needs 1 $\times 3$	$\Rightarrow$		three single bonds	$\text{PCl}_3$