12.13) Use the graphs in figure 10.11 to find the energy needed to transfer an electron from Cs to I, N to O, N to N, Na to Br. Two of these bonds bond ionically, which two?

\[ \Delta E = IE - EA \]  

Cs to I: \[ \Delta E = IE(Cs) - EA(I) = 3.89 - 3.06 = 0.83 \text{eV} \]

N to O: \[ \Delta E = 14.53 - 1.46 = 13.07 \text{eV} \]

N to N: \[ \Delta E = 14.53 - 0 = 14.53 \text{eV} \]

Na to Br: \[ \Delta E = 5.14 - 3.36 = 1.78 \text{eV} \]

Find \( R_c \) for each pair (12.9)

\[ R_c = \frac{k e^2}{\Delta E} \]

\[ R_{c, CsI} = \frac{1.44 \text{eV nm}}{0.83} = 1.73 \text{nm} \]

\[ R_{c, NO} = \frac{1.44 \text{eV nm}}{13.07 \text{eV}} = 0.11 \text{nm} \]  \{Too small, these won't bond ionically\}

\[ R_{c, NZN} = \frac{1.44 \text{eV nm}}{14.53 \text{eV}} = 0.099 \text{nm} \]

\[ R_{c, NaBr} = \frac{1.44 \text{eV nm}}{1.78 \text{eV}} = 0.81 \text{nm} \]  \{Bond ionically\}

\[ \begin{align*}
\text{Cs} & \quad 3.89 & \quad 0.47 \\
\text{I} & \quad 10.45 & \quad 3.06 \\
\text{Br} & \quad 11.81 & \quad 3.36 \\
\text{Na} & \quad 5.14 & \quad 0.55 \\
\text{N} & \quad 14.53 & \quad 0
\end{align*} \]