

MOLECULAR STRUCTURE

Chpt. 9 & BONDING - 1

p. 1 of 2

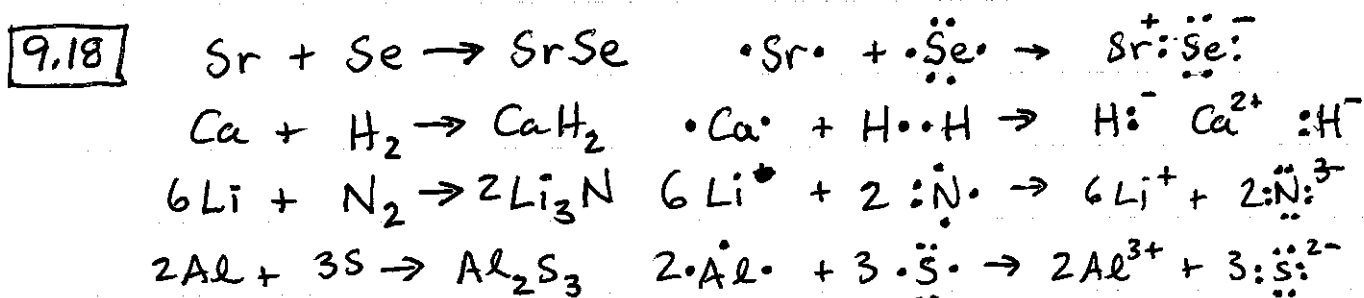
Chang- p. 406 #9.15, 9.18, 9.19, 9.23, 9.25, 9.26 (6 prob)

9.15 @ doubling r_{A+} would decrease the bond strength (if dist. from nucleus A^+ to nucleus of B^- were doubled, we could say that the bond strength would be cut in half, but we cannot be that specific here.)

ⓑ Tripling the charge on the cation triples the bond strength

ⓒ Doubling the charges on both ions quadruples the bond strength

ⓓ Decreasing both radii to half would double the bond strength



9.19 @ I & Cl $\rightarrow$ covalent I-Cl (ICl) iodine monochloride

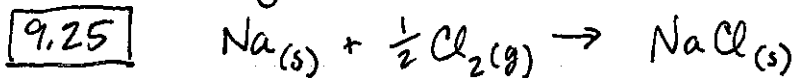
ⓑ Mg & F $\rightarrow$ ionic $:\ddot{\text{F}}:\text{Mg}^{2+}:\ddot{\text{F}}:$ (MgF_2) magnesium fluoride

9.23 @ KCl or **MgO** (expl: MgO has greater charges AND smaller radii)

ⓑ **LiF** or LiBr (expl: Same charges, F^- has a smaller radius than Br^-)

ⓒ **Mg₃N₂** or NaCl (expl: Mg_3N_2 has greater charges AND smaller radii)

Chang - Chpt. 9 (cont.)

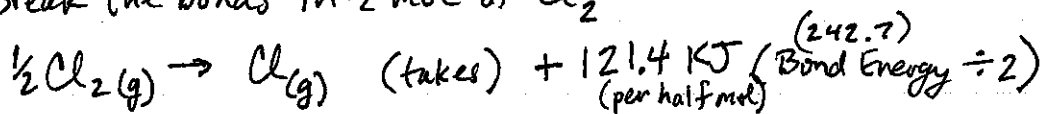


$\Delta H_f^\circ = -411 \text{ KJ/mol}$
(This is the total energy change for the entire process!)

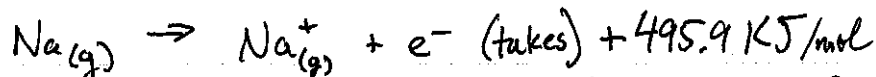
- ① Sublime the sodium



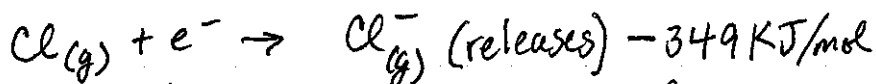
- ② Break the bonds in $\frac{1}{2}$ mol of Cl_2



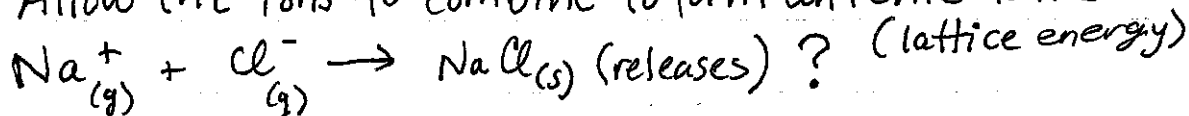
- ③ Ionize the sodium (1st Ionization Energy)



- ④ Ionize the chlorine (~~ionize~~) (electron affinity)



- ⑤ Allow the ions to combine to form an ionic lattice



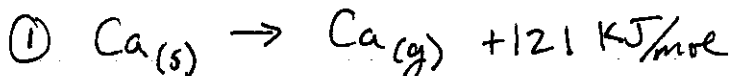
① + ② + ③ + ④ + ⑤ $\rightarrow$ TOTAL

$+108 \text{ KJ} + 121.4 \text{ KJ} + 495.9 \text{ KJ} + (-349 \text{ KJ}) + (-x) = -411 \text{ KJ}$

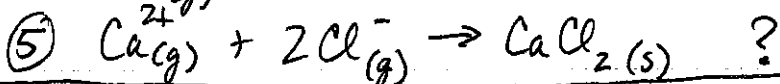
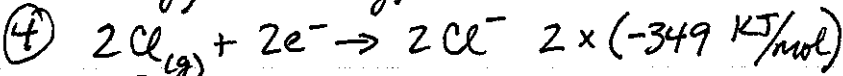
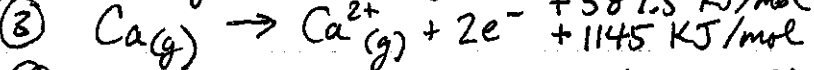
$376.3 \text{ KJ} + x = -411 \text{ KJ}$

$376.3 \text{ KJ} + 411 \text{ KJ} = -x = -787.3 \text{ KJ/mol}$

$-x = +787.3 \text{ KJ}$
so $\rightarrow$



1st AND
2nd



-795 KJ/mol

$+1400.2 \text{ KJ} + x = -795 \text{ KJ/mol}$

$-x = +2195.2$

so

$x = -2195.2 \text{ KJ}$

KJ/mol means
per mol of
product
or of
"the reaction"