

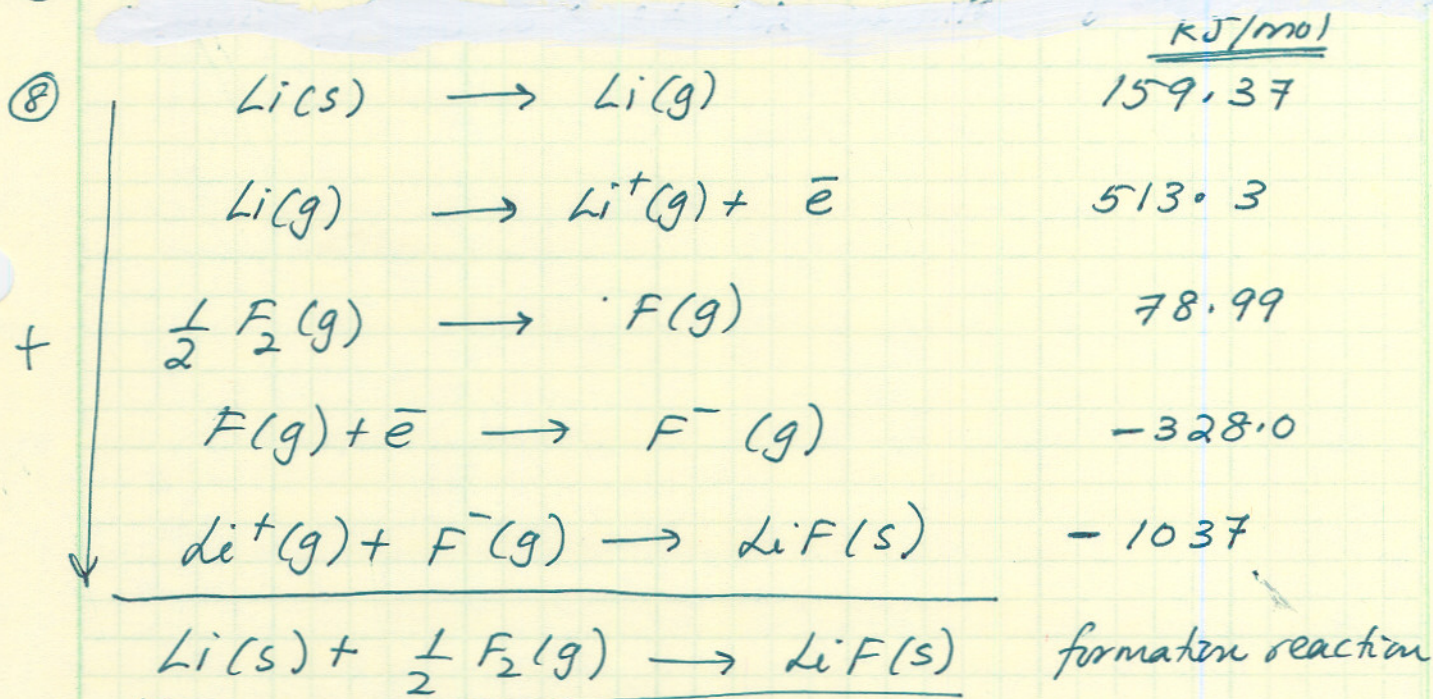
INTRODUCTION TO NATURAL SCIENCE

CHEMISTRY HOMEWORK - WINTER 2007 - WEEK 6

Chapter 9

⑤ most negative will be MgS
least negative will be KI
(larger the ion, the lower ^(less negative) the lattice energy)

⑦ $RbI < LiI < LiF < CaO$



Final reaction = sum of the first 5 reactions

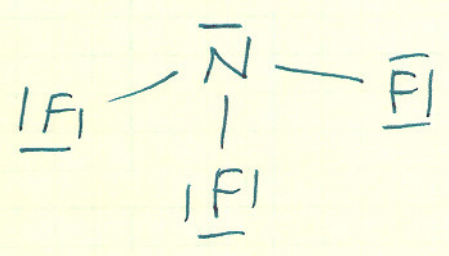
\therefore energy of the final reaction } = sum of the energies of the first 5 reactions.

$$\begin{aligned} \text{energy of formation of } LiF(s) \} &= [159.37 + 513.3 + 78.99 + (-328.0) + (-1037)] \text{ KJ/mol} \\ &= \underline{\underline{-607 \text{ KJ/mol}}} \end{aligned}$$

- (10) (a) NaCl because it has higher lattice energy than RbCl
 (b) MgO (has higher lattice energy than BaO)
 → (c) MgS (has higher lattice energy than NaCl)

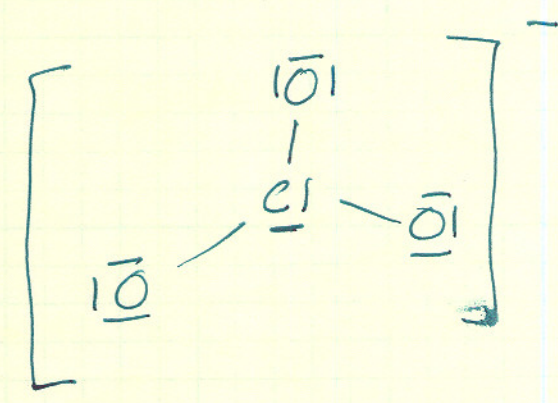
(11) (a) valence e

N	5
3 F	21
	<u>26 e</u>
	13 e pairs
	- 3 bonds
	<u>10 e pairs</u>



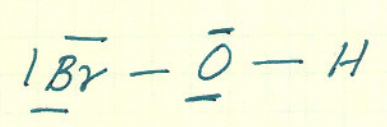
(b)

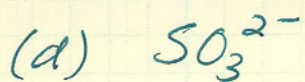
Cl	7 e
3 x O	18 e
-1	1 e
	<u>26 e</u>
	13 e pairs
	- 3 bonds
	<u>10 e pairs</u>



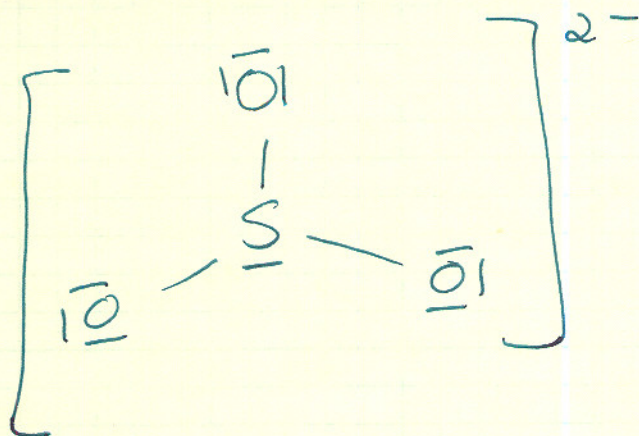
(c)

H	1 e
O	6 e
Br	7 e
	<u>14 e</u>
	7 e pairs
	- 2 bonds
	<u>5 e pairs</u>





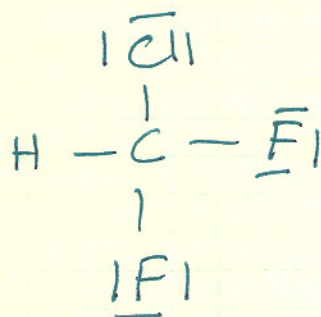
$$\begin{array}{r}
 \text{S} \quad 6\bar{e} \\
 3 \times \text{O} \quad 18\bar{e} \\
 - 2 \quad \quad 2\bar{e} \\
 \hline
 2 \overline{)26\bar{e}} \\
 13\bar{e} \text{ pairs} \\
 - 3 \text{ bonds} \\
 \hline
 10\bar{e} \text{ pairs}
 \end{array}$$



(13)

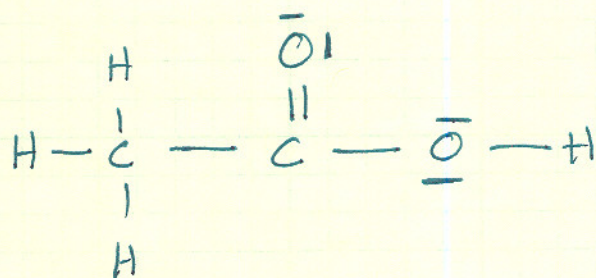
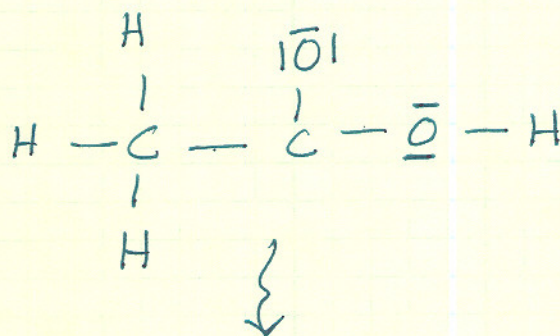
(a)

$$\begin{array}{r}
 \text{C} \quad 4\bar{e} \\
 \text{H} \quad 1\bar{e} \\
 \text{Cl} \quad 7\bar{e} \\
 2 \times \text{F} \quad 14\bar{e} \\
 \hline
 2 \overline{)26\bar{e}} \\
 13\bar{e} \text{ pairs} \\
 - 4 \text{ bonds} \\
 \hline
 9\bar{e} \text{ pairs}
 \end{array}$$

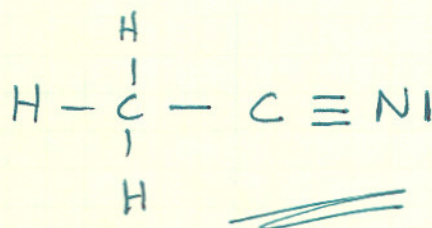
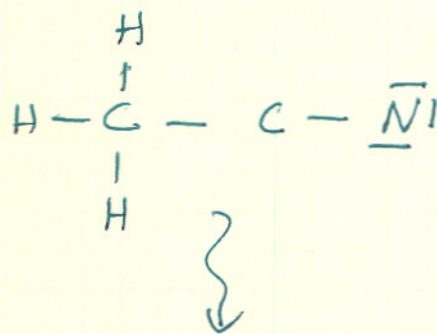


(b)

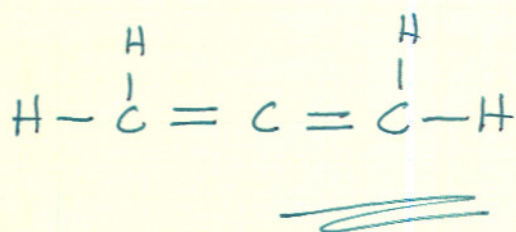
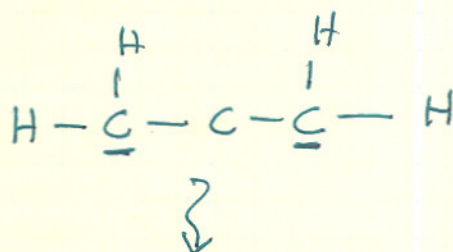
$$\begin{array}{r}
 2 \times \text{C} = 8\bar{e} \\
 4 \times \text{H} = 4\bar{e} \\
 2 \times \text{O} = 12\bar{e} \\
 \hline
 2 \overline{)24\bar{e}} \\
 12\bar{e} \text{ pairs} \\
 - 7 \text{ bonds} \\
 \hline
 5\bar{e} \text{ pairs}
 \end{array}$$



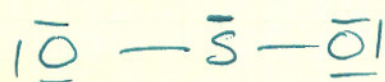
$$\begin{array}{l}
 \bullet \text{ (c) } 2 \times C = 8 \bar{e} \\
 3 \times H = 3 \bar{e} \\
 N = 5 \bar{e} \\
 \hline
 2 \overline{16 \bar{e}} \\
 8 \bar{e} \text{ pairs} \\
 - 5 \text{ bonds} \\
 \hline
 3 \bar{e} \text{ pairs}
 \end{array}$$

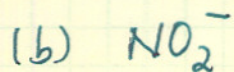


$$\begin{array}{l}
 \text{(d) } 3 \times C = 12 \bar{e} \\
 4 \times H = 4 \bar{e} \\
 \hline
 2 \overline{16 \bar{e}} \\
 8 \bar{e} \text{ pairs} \\
 - 6 \text{ bonds} \\
 \hline
 2 \bar{e} \text{ pairs}
 \end{array}$$

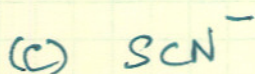
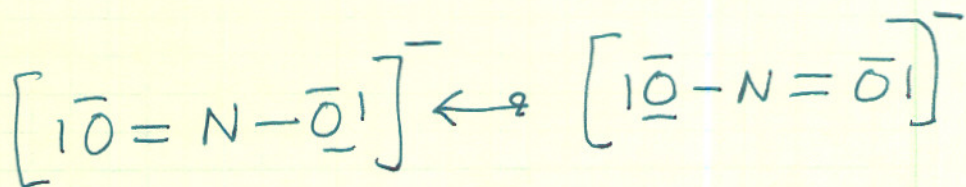
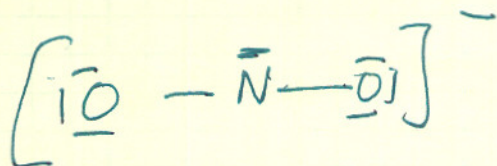


$$\begin{array}{l}
 \text{(15) (a) } S \quad 6 \bar{e} \\
 2 \times O \quad 12 \bar{e} \\
 \hline
 2 \overline{18 \bar{e}} \\
 9 \bar{e} \text{ pairs} \\
 - 2 \text{ bonds} \\
 \hline
 7 \bar{e} \text{ pairs}
 \end{array}$$

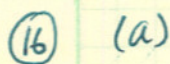
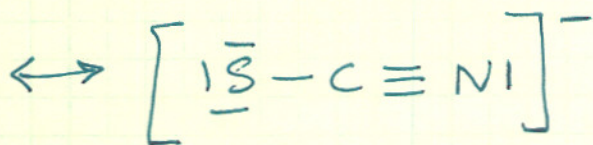
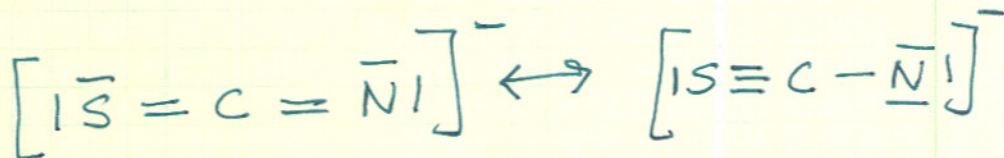
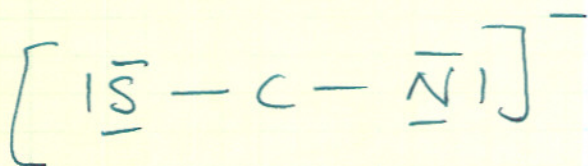




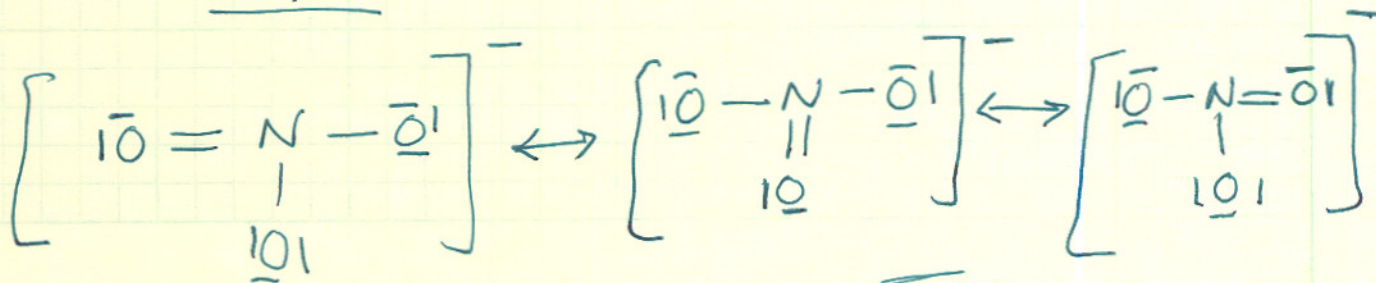
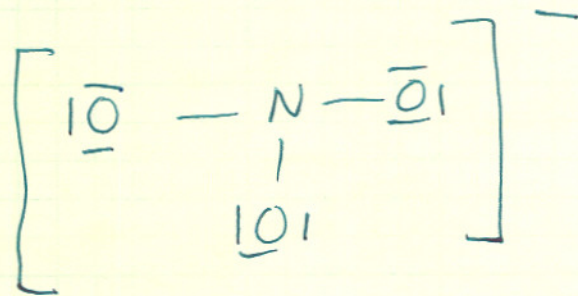
$$\begin{array}{r}
 \text{N} \quad 5\bar{e} \\
 2 \times \text{O} \quad 12\bar{e} \\
 -1 \quad 1\bar{e} \\
 \hline
 2 \quad | \quad 18\bar{e} \\
 \quad \quad 9\bar{e} \text{ pairs} \\
 \quad \quad -2 \text{ bonds} \\
 \hline
 \quad \quad 7\bar{e} \text{ pairs}
 \end{array}$$

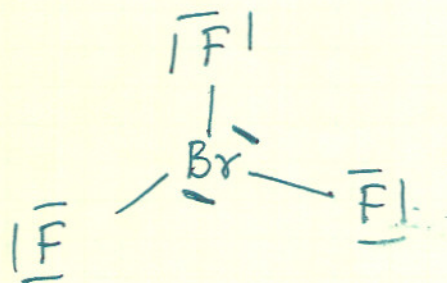
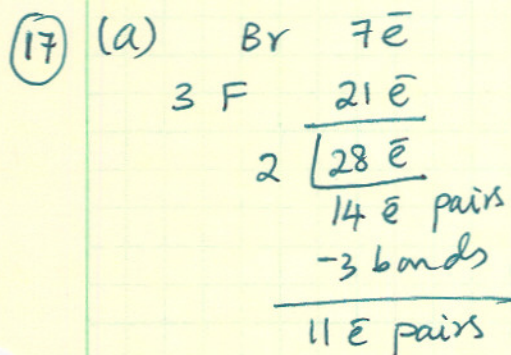
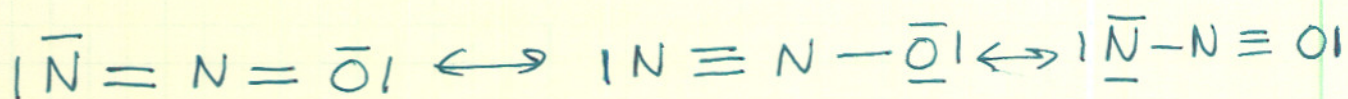
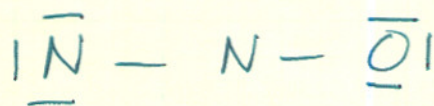
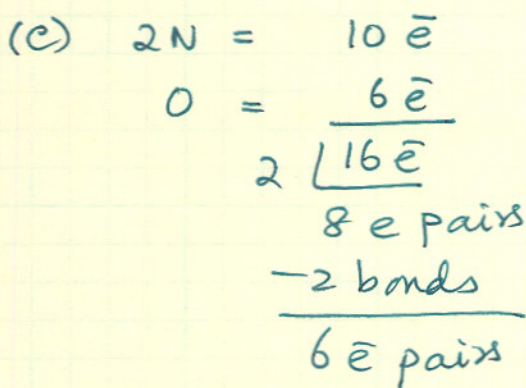
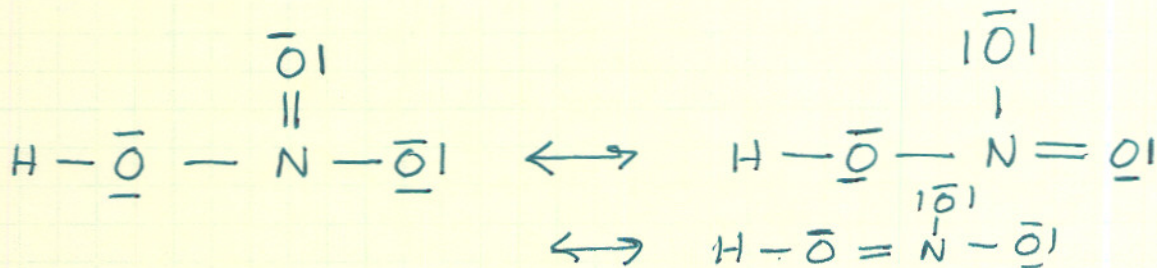
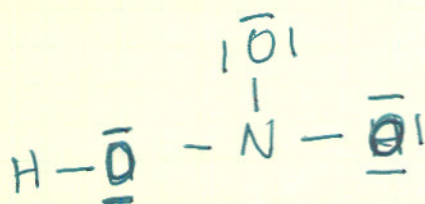
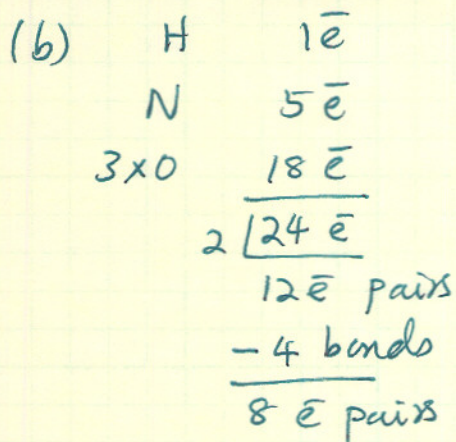


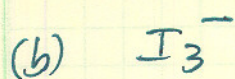
$$\begin{array}{r}
 \text{S} \quad 6\bar{e} \\
 \text{C} \quad 4\bar{e} \\
 \text{N} \quad 5\bar{e} \\
 -1 \quad 1\bar{e} \\
 \hline
 2 \quad | \quad 16\bar{e} \\
 \quad \quad 8\bar{e} \text{ pairs} \\
 \quad \quad -2 \text{ bonds} \\
 \hline
 \quad \quad 6\bar{e} \text{ pairs}
 \end{array}$$



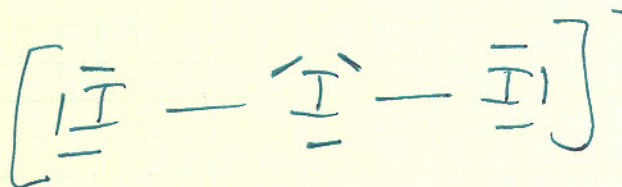
$$\begin{array}{r}
 \text{N} \quad 5\bar{e} \\
 3 \text{ O} \quad 18\bar{e} \\
 -1 \quad 1\bar{e} \\
 \hline
 2 \quad | \quad 24\bar{e} \\
 \quad \quad 12\bar{e} \text{ pairs} \\
 \quad \quad -3 \text{ bonds} \\
 \hline
 \quad \quad 9\bar{e} \text{ pairs}
 \end{array}$$



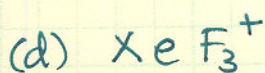
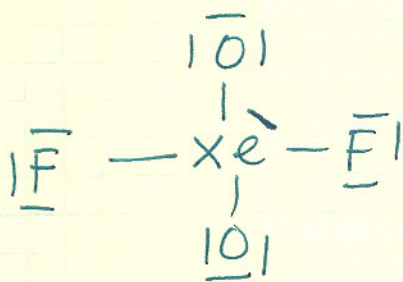




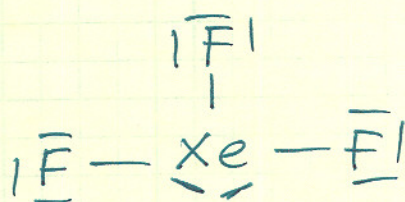
$$\begin{array}{r} 3 \times I = 21 \bar{e} \\ -1 \\ \hline 2 \overline{22 \bar{e}} \\ 11 \bar{e} \text{ pairs} \\ -2 \text{ bonds} \\ \hline 9 \bar{e} \text{ pairs} \end{array}$$



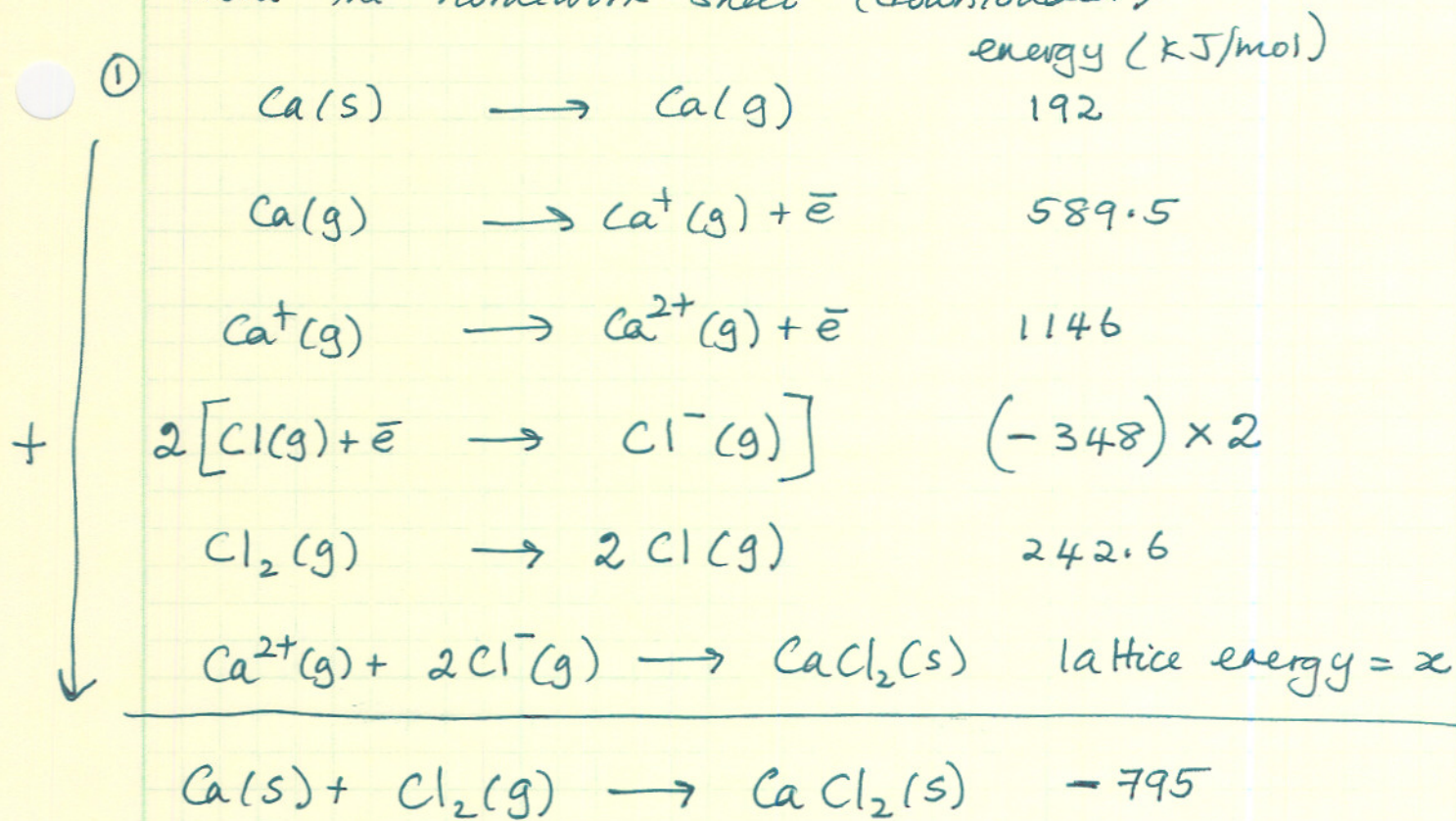
$$\begin{array}{r} Xe = 8 \bar{e} \\ 2 \times O = 12 \bar{e} \\ 2 \times F = 14 \bar{e} \\ 2 \overline{34 \bar{e}} \\ 17 \bar{e} \text{ pairs} \\ -4 \text{ bonds} \\ \hline 13 \bar{e} \text{ pairs} \end{array}$$



$$\begin{array}{r} Xe = 8 \bar{e} \\ 3 \times F = 21 \bar{e} \\ \hline 29 \bar{e} \\ +1 \text{ charge} = -1 \bar{e} \\ \hline 2 \overline{28 \bar{e}} \\ 14 \bar{e} \text{ pairs} \\ - 3 \text{ bonds} \\ \hline 11 \bar{e} \text{ pairs} \end{array}$$



From the homework sheet (downloaded)



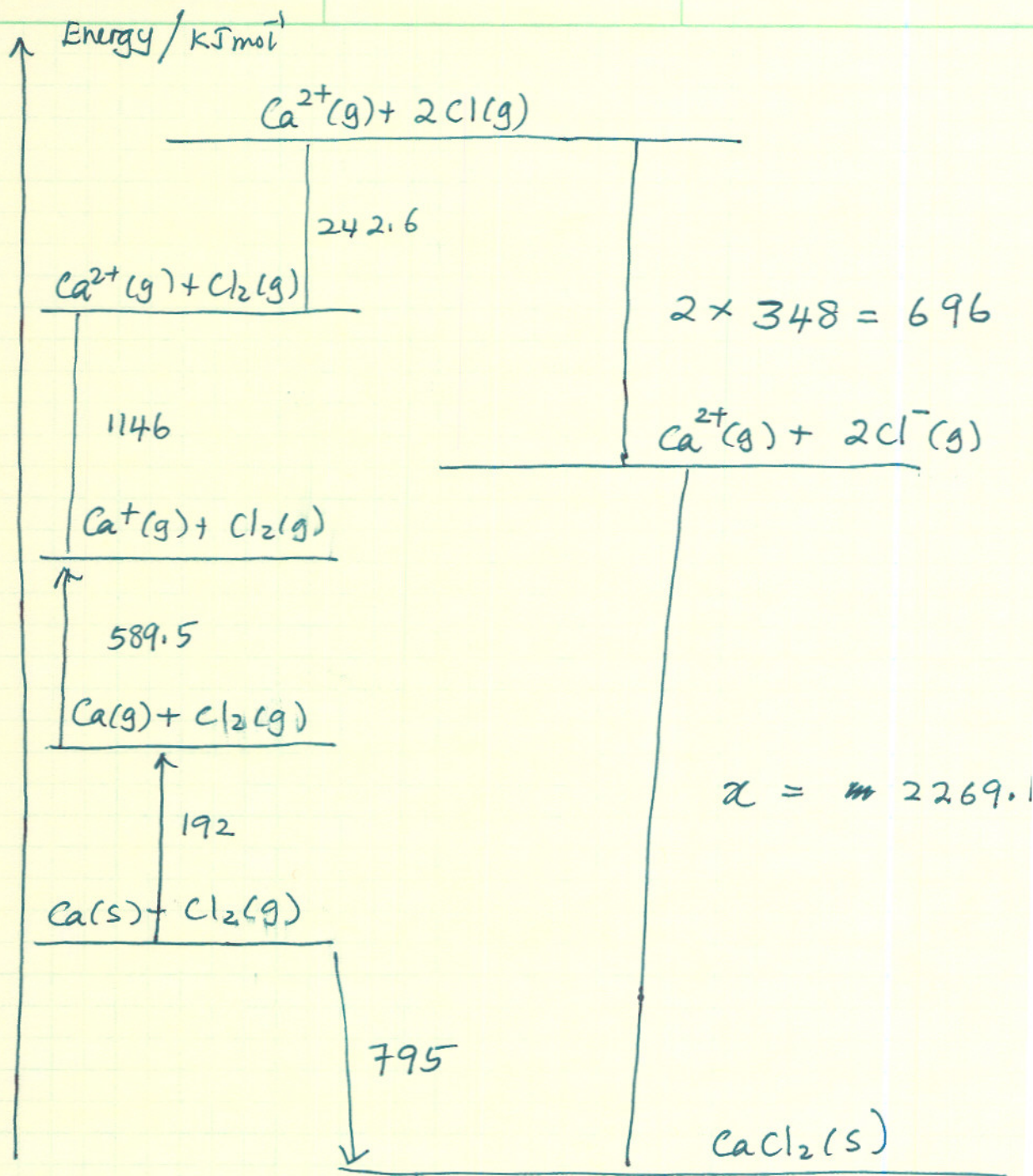
since the final reaction is the sum of the first six steps

energy of the } = sum of the energies of the
final reaction } first six steps

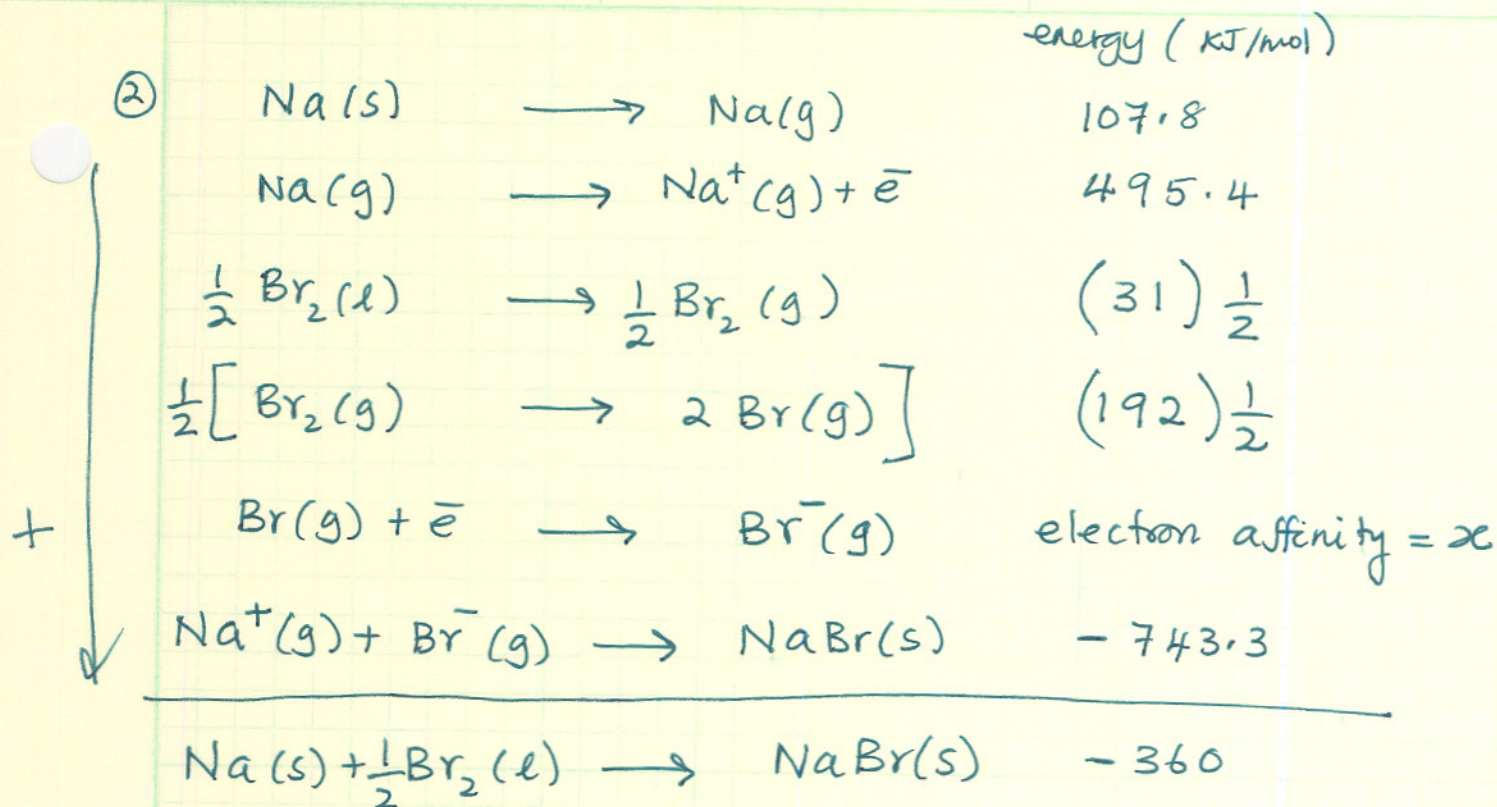
$$-795 \text{ kJ/mol} = (192 + 589.5 + 1146 + 2(-348) + 242.6 + x) \text{ kJ/mol}$$

$$-795 \text{ kJ/mol} = (1474.1 + x) \text{ kJ/mol}$$

$$x = \underline{\underline{-2269.1 \text{ kJ/mol}}}$$



(not to scale)



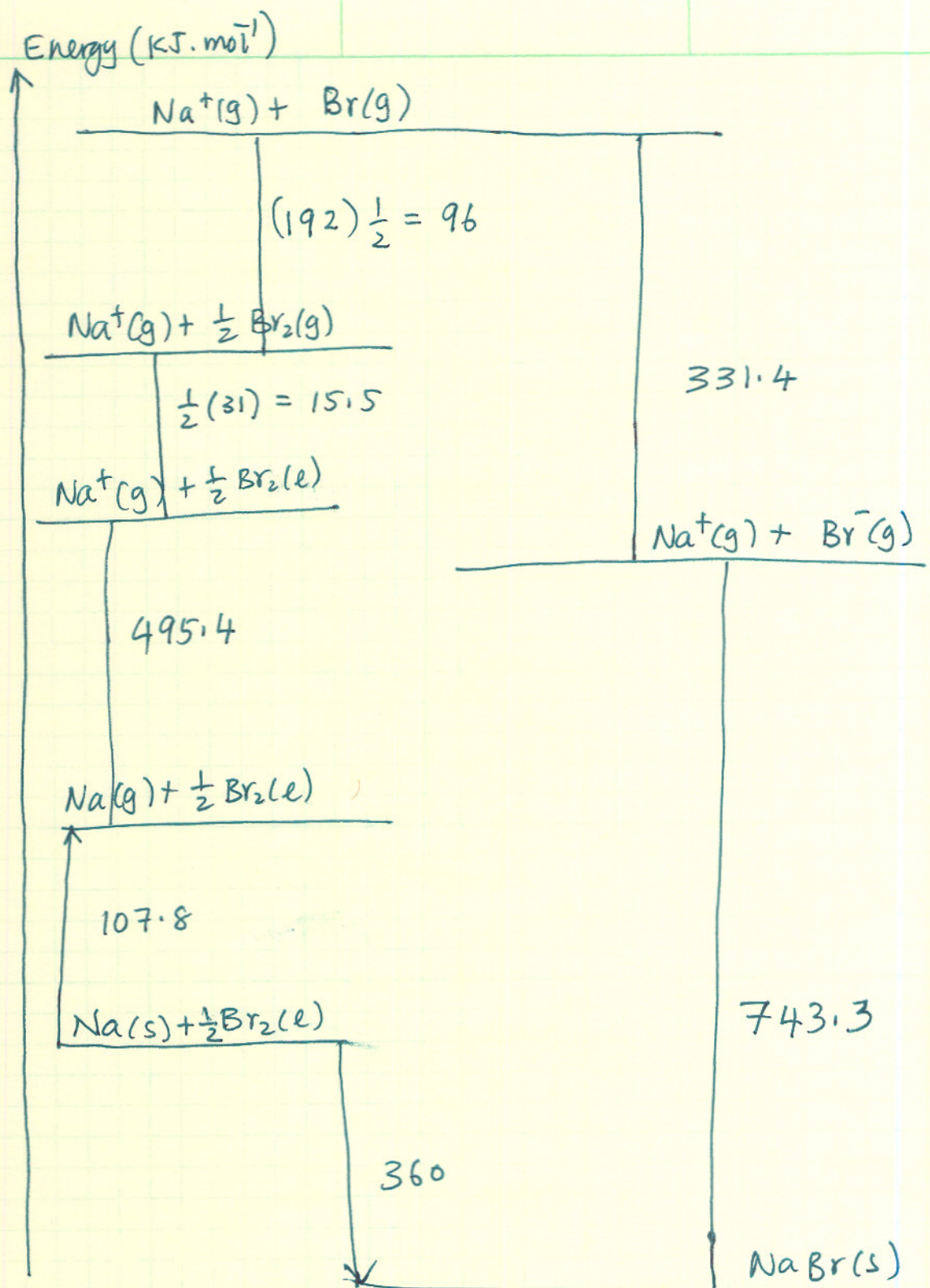
Since the final reaction = sum of the first six steps

energy of the final reaction = sum of the energies of the first six steps

$$-360 \text{ kJ/mol} = \left[107.8 + 495.4 + \frac{1}{2}(31) + \frac{1}{2}(192) + x - 743.3 \right] \text{ kJ/mol}$$

$$-360 \text{ kJ/mol} = (-28.6 + x) \text{ kJ/mol}$$

$$x = -331.4 \text{ kJ/mol}$$



Not drawn to scale.