28.) $\overset{+2}{Ba}\overset{-1}{I_2}$

$Ba_{(s)} \rightarrow Ba_{(g)}$	ΔH_{sub} (endo)
$Ba_{(g)} \rightarrow Ba^+_{(g)} + e^-$	1st IE (endo)
$Ba^+_{(g)} \rightarrow Ba^{2+}_{(g)} + e^-$	2nd IE (endo)
$I_{2(s)} \rightarrow I_{2(g)}$	ΔH_{sub} (endo)
$I_{2(g)} \rightarrow 2I_{(g)}$	BE (endo)
$2(I_{(g)} + e^- \rightarrow I^-_{(g)})$	1st e.a. (exo)
$Ba^{2+}_{(g)} + 2I^-_{(g)} \rightarrow BaI_{2(s)}$	LE (exo)
$Ba_{(s)} + I_{2(s)} \rightarrow BaI_{2(s)}$	$\Delta H_f = ?$

8.29) RbCl Lattice Energy?

1.) $Rb_{(s)} \rightarrow Rb_{(g)}$ $+85.8$ kJ/mol

2.) $Rb_{(g)} \rightarrow Rb^+_{(g)} + e^-$ $+403$ kJ/mol

3.) $\frac{1}{2}Cl_{2(g)} \rightarrow Cl_{(g)}$ $+121.7$ kJ/mol

4.) $Cl_{(g)} + e^- \rightarrow Cl^-_{(g)}$ -349 kJ/mol

5.) $Rb^+_{(g)} + Cl^-_{(g)} \rightarrow RbCl_{(s)}$ LE = ? -692 kJ/mol

6.) $Rb_{(s)} + \frac{1}{2}Cl_{2(g)} \rightarrow RbCl_{(s)}$ $\Delta H_f = -430.5$ kJ/mol

$$-430.5 - [(-349) + 121.7 + 403 + 85.8] = -692 \text{ kJ/mol}$$

CH. 8

35. a) O_2

N $2(8) = 16$
A $2(6) = 12$
S → 4
U → 8

b) 4 bonding e^-

c) Double bonds are shorter and stronger than single bonds.

37. (b) is False! Know definition of each!

42. a) C−F, O−F, Be−F

O−F < C−F < Be−F — From the periodic Trend.

FO Cl N Br I S C → Be

(similar EN) — Be & F have EN that are far apart

b) O−Cl, S−Br, C−P

S−Br < C−P < O−Cl → From EN values Fig 8.8

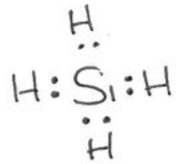
Per 3 S, Per 4 Br < Per 2 C, Per 3 P < Per 2 O, Per 3 Cl

c) C−S, B−F, N−O

C−S < N−O < B−F — used FOClNBrISC

FO Cl N Br I S C → B

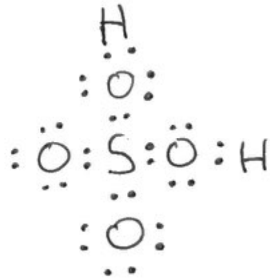
47. a) SiH_4



b.)

c)

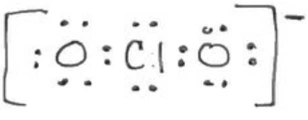
d)



H_2SO_4
$2(2) + 8 + 4(8) = 44$
$2(1) + 6 + 4(6) = 32$
12
20

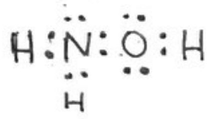
e) ClO_2^-

$8 + 2(8) = 24$
$7 + 2(6) + 1 = 20$
4
16



f) NH_2OH

$8 + 3(2) + 8 = 22$
$5 + 3(1) + 6 = 14$
8
6



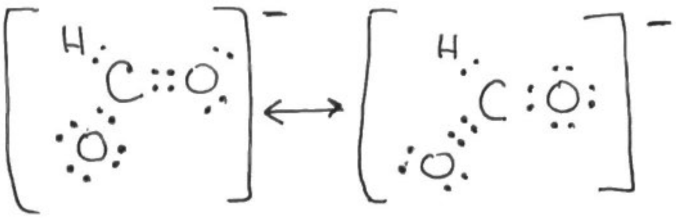
54. a) HCO_2^-

$2 + 8 + 2(8) = 26$

$1 + 4 + 2(6) + 1 = 18$

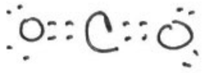
8

10



b) Yes → RESONANCE!

c) CO_2

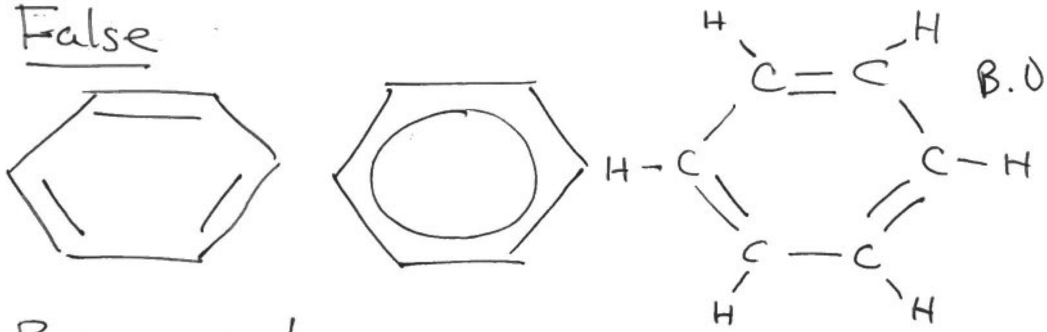


(CO_2) B.O. = $\frac{4}{2} = 2$

(HCO_2^-) B.O. = $\frac{3}{2} = 1\frac{1}{2}$

The C–O bonds in CO_2 are shorter and stronger than the C–O bonds in HCO_2^-. The bonds in CO_2 are double bonds. The bonds in HCO_2^- are an average of one single and one double bond.

57. a) False



B.O. $\frac{4}{3} = 1\frac{1}{3}$

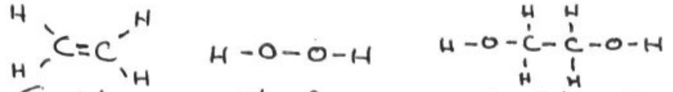
Resonance!

The bonds in benzene are shorter than C–C single bonds, but they are all the same length.

b) False

H:C:::C:H

↳ triple covalent bond is shorter than a double bond

69. a) 

$C_2H_4 + H_2O_2 \rightarrow C_2H_6O_2$ balanced!

$\Delta H_r = $ [sum of the bonds broken] − [sum of the bonds formed]

$\Delta H_r = [(C-C) + 2(C-O) + 2(O-H) + 4(C-H)] -$

$[2(C=C) + 4(C-H) + (O-O) + 2(O-H)]$

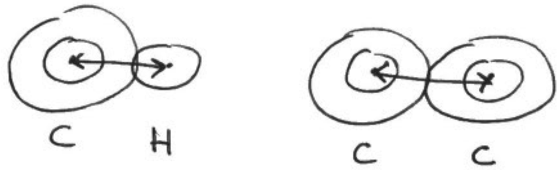
$\Delta H_r = -304\ kJ$

b) $\Delta H_r = -82\ kJ$

c) $\Delta H_r = -467\ kJ$

71. a) False – longer bonds are weaker
↓
lower bond enthalpy

b) False – C-H bonds are shorter and stronger.



c) ? do not need to know this ☺ → False. Single bond lengths are less than 5 Å. (See Table 8-4)

d) False. Breaking a chemical bond requires an input of energy.

e) True

73. Ionic bond energies depend on charge and size of the ions.

NaCl: $E = \frac{(+1)(-1)}{r}$

CaO: $E = \frac{(+2)(-2)}{r}$ } has greater charge so bond is stronger

79. a) $\overset{+2\ -1}{BeH_2}$ 3205 kJ/mol

$\overset{+2\ -1}{MgH_2}$ 2791 kJ/mol

$\overset{+2\ -1}{CaH_2}$ 2410 kJ/mol

$\overset{+2\ -1}{SrH_2}$ 2250 kJ/mol

$\overset{+2\ -1}{BaH_2}$ 2121 kJ/mol

metal hydrides → (H is a −1)

H^- is the hydride ion!

b) $\frac{Q_1 Q_2}{r}$ as r ↓s, LE ↑s

so BeH_2 has smallest r

c) Breaking apart the crystal lattice requires energy → endothermic.

d) $\overset{+2\ -1}{ZnH_2}$ 2870 kJ/mol

$\overset{+2\ -1}{MgH_2}$ 2791 kJ/mol

→ Charges are same so must also have similar r's if LE's are similar.

Coulomb's law: $\frac{Q_1 Q_2}{r} = LE$

100. K_2O

1) $2K_{(s)} \rightarrow 2K_{(g)}$	2(89.99)	179.98
2) $2K_{(g)} \rightarrow 2K^+ + e$	2(419)	838
3) $\frac{1}{2}O_{2(g)} \rightarrow O_{(g)}$	½(495)	247.5
4) $O_{(g)} + e^- \rightarrow O^-_{(g)}$	(-141)	-141
5) $O^- + e^- \rightarrow O^{2-}_{(g)}$	( )	X
6) $2K^+_{(g)} + O^{2-}_{(g)}$	(-2238)	-2238
$2K^+_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow K_2O_{(s)}$	(-363.2)	-363.2

$$-363.2 = -1113.52 + X$$

$$\boxed{X = +750\ kJ}$$