

CHEMISTRY 1A (CHEM1101) November 2002

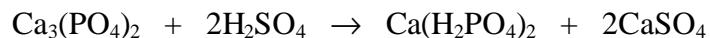
2002-N-2

- Standard enthalpy of formation of a compound is the enthalpy change that occurs when one mole of the compound is formed from its elements; reactants and product all being in their standard states.



- $3\text{Al(s)} + 3\text{NH}_4\text{ClO}_4(\text{s}) \rightarrow \text{Al}_2\text{O}_3(\text{s}) + \text{AlCl}_3(\text{s}) + 3\text{NO(g)} + 6\text{H}_2\text{O(g)}$
ammonium perchlorate
aluminium oxide
aluminium chloride
nitric oxide or nitrogen(II) oxide or nitrogen monoxide
- Compound. The loss of mass shows that the substance has decomposed and a gaseous component has been evolved and lost.

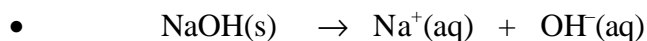
2002-N-3



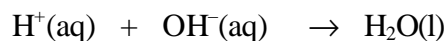
0.63 tonne

- 179 kJ mol^{-1} $4.48 \times 10^{14} \text{ s}^{-1}$
- hydrogen bonds
covalent bonds
dispersion forces
metallic bonds

2002-N-4



$$\Delta H = -35 \text{ kJ mol}^{-1}$$

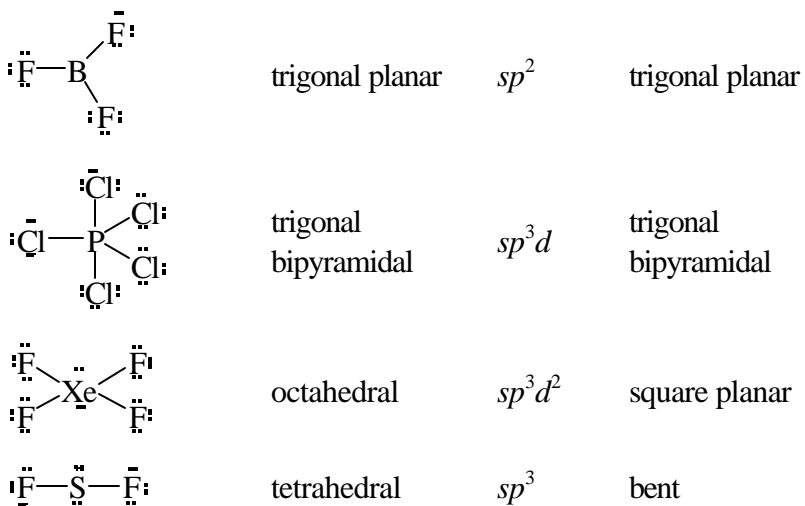


$$\Delta H = -59 \text{ kJ mol}^{-1}$$

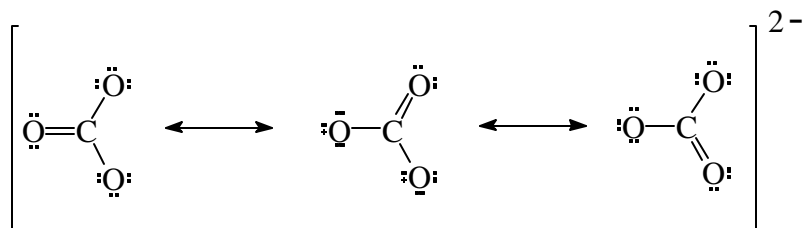
Within experimental error, the sum of the enthalpy changes for the above 2 reactions equals the enthalpy change for the given reaction, thus verifying Hess's Law - the enthalpy change for a reaction is independent of the route taken.

2002-N-5

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2002-N-6

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$$\text{Rate} = k[\text{Fe}^{2+}]^3[\text{O}_2][\text{H}^+]$$

$$5 \times 10^9 \text{ L}^4 \text{ mol}^{-4} \text{ s}^{-1}$$

$$2.6 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$$

$$0.2 \text{ mol L}^{-1} \text{ s}^{-1}$$

2002-N-7

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$$172.5 \text{ kJ mol}^{-1} \qquad 175.6 \text{ J K}^{-1} \text{ mol}^{-1}$$

$$p^2(\text{CO}) / p(\text{CO}_2)$$

$$-3.1 \text{ kJ mol}^{-1} \qquad 1.5 \text{ atm}$$

2002-N-8

0.30

No

No

Yes

2002-N-9

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2.83

16.8 mL