DPP-2 [Thermochemical Equation & Hess Law]

You don't have to be great to start, but you have to start to be great..

Q1. In Kirchhoff's equation which factor affects the heat of reaction:

(1) Pressure
(2) Temperature
(3) Volume
(4) Atomicity

Q2. For the reaction $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$, $\Delta C_p = 7.63$ cal deg^{-1} and $\Delta H_{298} = 68.3$ kcal, what will be the value of ΔH at 100°C (in kcal)?

(1) $7.63(373 - 298) - 68.3$
(2) $7.63 \times 10^{-3}(373 - 298) - 68.3$
(3) $7.63 \times 10^{-3}(373 - 298) + 68.3$
(4) $7.63(373 - 298) + 68.3$

Q3. The enthalpy of a reaction at 273 K is –3.57 kJ. What will be the enthalpy of reaction at 373 K if $\Delta C_p = 0$?

(1) –3.57
(2) 0
(3) $-3.57 \times \frac{373}{273}$
(4) –375

Q4. Which of the following is NOT applicable for a thermochemical equation?

(1) It tells about physical state of reactants and products
(2) It tells whether the reaction is spontaneous
(3) It tells whether the reaction is exothermic or endothermic
(4) It tells about the allotropic form of the reactants

Q5. The correct thermochemical equation is:

(1) $C + O_2 \rightarrow CO_2$; $\Delta H = -94$ kcal
(2) $C + O_2 \rightarrow CO_2$; $\Delta H = +94$ kcal
(3) $C(s) + O_2(g) \rightarrow CO_2(g)$; $\Delta H = -94$ kcal
(4) $C(s) + O_2(g) \rightarrow CO_2(g)$; $\Delta H = +94$ kcal

Q6. According to $C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g)$, $\Delta H = -26.4$ kcal:

(1) CO is an endothermic compound
(2) CO is an exothermic compound
(3) The reaction is endothermic
(4) None of these

Q7. Which of the following represents an exothermic reaction:

(1) $N_2(g) + O_2(g) \rightarrow 2NO(g)$, $\Delta H = +180.5$ kJ
(2) $H_2O(g) + C(s) \rightarrow CO(g) + H_2(g)$, $\Delta E = +131.2$ kJ
(3) $2HgO(s) + 180.4$ kJ $\rightarrow 2Hg(l) + O_2(g)$
(4) $Zn(s) + O_2(g) \rightarrow ZnO(s)$, $\Delta E = -693.8$ kJ

Q8. The heat change during reaction 24 g C and 128 g S forming CS_2, $\Delta H = 22$ kcal, is:

(1) 22 kcal
(2) 11 kcal
(3) 44 kcal
(4) 32 kcal

Q9. If heat of reaction A + 5B → 2C + 3D is –50 kJ, what is the heat of 2A + 10B → 4C + 6D?

(1) –50 kJ
(2) –25 kJ
(3) –100 kJ
(4) +100 kJ

Q10. The process $CH_3COOH \rightarrow CH_3COO^- + H^+$ should be:

(1) Exothermic
(2) Endothermic
(3) Neither exothermic nor endothermic
(4) Depends on temperature

Q11. The enthalpy change of a reaction does not depend on:

(1) State of reactants and products
(2) Nature of reactants and products
(3) Different intermediate reactions
(4) Initial and final enthalpy change

Q12. From thermochemical reactions:

$C(graphite) + \frac{1}{2}O_2 \rightarrow CO$, $\Delta H = -110.5$ kJ

$CO + \frac{1}{2}O_2 \rightarrow CO_2$, $\Delta H = -283.2$ kJ

The heat of $C(graphite) + O_2 \rightarrow CO_2$ is:

(1) 393.7 kJ
(2) –393.7 kJ
(3) –172.7 kJ
(4) +172.7 kJ

Q13. If $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$, $\Delta H = -44$ kcal

$2Na(s) + 2HCl(g) \rightarrow 2NaCl(s) + H_2(g)$, $\Delta H = -152$ kcal

Then $Na(s) + 0.5\ Cl_2(g) \rightarrow NaCl(s)$, ΔH = ?

(1) 108 kcal
(2) 196 kcal
(3) –98 kcal
(4) 54 kcal

Q14. Given:

$Zn(s) + \frac{1}{2}O_2(g) \rightarrow ZnO(s)$, $\Delta H = -84,000$ cal
$Hg(l) + \frac{1}{2}O_2(g) \rightarrow HgO(s)$, $\Delta H = -21,700$ cal
Find ΔH for: $Zn(s) + HgO(s) \rightarrow ZnO(s) + Hg(l)$

(1) 105,700 cal
(2) 62,300 cal
(3) –105,700 cal
(4) –62,300 cal

Q15. Find the heat change for the reaction: $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$ using the following data:

$NH_3(g) + aq \rightarrow NH_3(aq)$, $\Delta H = -8.4$ kcal
$HCl(g) + aq \rightarrow HCl(aq)$, $\Delta H = -17.3$ kcal
$NH_3(aq) + HCl(aq) \rightarrow NH_4Cl(aq)$, $\Delta H = -12.5$ kcal
$NH_4Cl(s) + aq \rightarrow NH_4Cl(aq)$, $\Delta H = +3.9$ kcal

(1) –42.1 kcal
(2) –34.3 kcal
(3) +34.3 kcal
(4) +42.1 kcal

Q16. **The heat of reaction for $A(s) + O_2(g) \rightarrow AO_2(s)$:**
$A(s) + \frac{1}{2}O_2(g) \rightarrow AO(s)$, $\Delta H = -50$ kcal
$AO(s) + \frac{1}{2}O_2(g) \rightarrow AO_2(s)$, $\Delta H = 100$ kcal

(1) –50 kcal
(2) –100 kcal
(3) –150 kcal
(4) –200 kcal

Q17. **Given:**
$C(s) + O_2(g) \rightarrow CO_2(g)$, $\Delta H = -94$ kcal
$CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$, $\Delta H = -67.7$ kcal
Find ΔH for: $C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g)$

(1) 20.6 kcal
(2) 26.3 kcal
(3) 44.2 kcal
(4) 161.6 kcal

Q18. **The enthalpy of vaporisation of water can be calculated from:**
$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$, $\Delta H = -285.77$ kJ mol^{-1}
$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(g)$, $\Delta H = -241.84$ kJ mol^{-1}

(1) +43.93 kJ mol^{-1}
(2) –43.93 kJ mol^{-1}
(3) +527.61 kJ mol^{-1}
(4) –527.61 kJ mol^{-1}

Q19. **The following two reactions are known:**
$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$; $\Delta H = -26.8$ kJ
$FeO(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$; $\Delta H = -16.5$ kJ
Correct target equation is:
$Fe_2O_3(s) + CO(g) \rightarrow 2FeO(s) + CO_2(g)$; ΔH =?

(1) –43.3 kJ
(2) –10.3 kJ
(3) +6.2 kJ
(4) +10.3 kJ

Q20. **Consider the following processes:**
$\frac{1}{2}A \rightarrow B$, $\Delta H = +150$ kJ mol^{-1}
$3B \rightarrow 2C + D$, $\Delta H = -125$ kJ mol^{-1}
$E + A \rightarrow 2D$, $\Delta H = +350$ kJ mol^{-1}
For $B + D \rightarrow E + 2C$, ΔH will be:

(1) +325 kJ mol^{-1}
(2) +525 kJ mol^{-1}
(3) –175 kJ mol^{-1}
(4) –325 kJ mol^{-1}

Q21. **Given:**
$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$, $\Delta H = -2220$ kJ mol^{-1}
$C_3H_6 + H_2 \rightarrow C_3H_8$, $\Delta H = -124$ kJ mol^{-1}
$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$, $\Delta H = -285$ kJ mol^{-1}
Then find heat of combustion of C_3H_6.

(1) –2059 kJ mol^{-1}
(2) +2059 kJ mol^{-1}
(3) –4118 kJ mol^{-1}
(4) +4118 kJ mol^{-1}

Q22. **For the process:**
ΔH (A $\rightarrow$ X) = 50 kJ
ΔH (Y $\rightarrow$ X) = 20 kJ
ΔH (B $\rightarrow$ Y) = 30 kJ
Then ΔH for A $\rightarrow$ B will be:

(1) 100 kJ
(2) –100 kJ
(3) 0
(4) –50 kJ

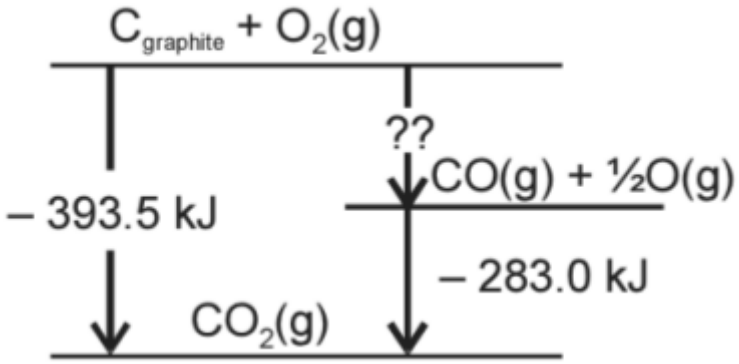
Q23. **Enthalpy changes for two reactions are given:**
$2Cr(s) + \frac{3}{2}O_2(g) \rightarrow Cr_2O_3(s)$, $\Delta H = -1130$ kJ
$C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g)$, $\Delta H = -110$ kJ
The enthalpy change for: $Cr_2O_3 + 3C \rightarrow 2Cr + 3CO$ will be:

(1) –1460 kJ
(2) –800 kJ
(3) +800 kJ
(4) +1020 kJ

Q24. **Three thermochemical equations are given:**
(i) $C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$; $\Delta H = x$ kJ mol^{-1}
(ii) $C_{(graphite)} + \frac{1}{2}O_2(g) \rightarrow CO(g)$; $\Delta H = y$ kJ mol^{-1}
(iii) $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$; $\Delta H = z$ kJ mol^{-1}
Based on the above, which relation is correct?

(1) $x = y - z$
(2) $z = x + y$
(3) $x = y + z$
(4) $y = 2z - x$

Q25. **A schematic representation of enthalpy changes for:**
$C_{(graphite)} + \frac{1}{2}O_2(g) \rightarrow CO(g)$ is given below.



The missing value is:

(1) +10.5 kJ
(2) –11.05 kJ
(3) –110.5 kJ
(4) –10.5 J

Q26. **For the reactions:**
A $\rightarrow$ B, $\Delta H_1 = x_1$
B $\rightarrow$ C, $\Delta H_2 = ?$

$C \rightarrow D$, $\Delta H_3 = x_3$
$A \rightarrow D$, $\Delta H = x$
The value of ΔH_2 is:

(1) $x - (x_1 + x_3)$
(2) $x + x_1 + x_3$
(3) $x_1 - x_3 - x$
(4) $(x_1 + x) - x_3$

Q27. **Consider the reaction:**
$4NO_2(g) + O_2(g) \rightarrow 2N_2O_5(g)$, $\Delta H = -111$ kJ
If $N_2O_5(s)$ is formed instead of $N_2O_5(g)$, the ΔH value will be:
(Given, ΔH of sublimation for N_2O_5 is 54 kJ mol^{-1})

(1) –165 kJ
(2) +54 kJ
(3) +219 kJ
(4) –219 kJ

Q28. **Given:**
$C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$, $\Delta H^\circ = -393.5$ kJ mol^{-1}
$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$, $\Delta H^\circ = -285.8$ kJ mol^{-1}
$CO_2(g) + 2H_2O(l) \rightarrow CH_4(g) + 2O_2(g)$, $\Delta H^\circ = +890.3$ kJ mol^{-1}
Based on the above equations, the value of ΔH° at 298 K for the reaction:
$C_{(graphite)} + 2H_2(g) \rightarrow CH_4(g)$ is:

(1) +74.8 kJ mol^{-1}
(2) +144.0 kJ mol^{-1}
(3) –74.8 kJ mol^{-1}
(4) –144.0 kJ mol^{-1}

Q29. **Given:**
(i) $C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$, $\Delta H^\circ = x$ kJ mol^{-1}
(ii) $C_{(graphite)} + \frac{1}{2}O_2(g) \rightarrow CO(g)$, $\Delta H^\circ = y$ kJ mol^{-1}
(iii) $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$, $\Delta H^\circ = z$ kJ mol^{-1}
Based on the above thermochemical equations, find out which one of the following algebraic relationships is correct:

(1) $x = y - z$
(2) $y = 2z - x$
(3) $z = x + z$
(4) $x = y + y$