

Cycles

1 Which one of the following equations correctly defines the enthalpy change of formation of carbon monoxide?



2 Which one of the following equations correctly defines the enthalpy change of formation of ethanol, $\text{C}_2\text{H}_5\text{OH}_{(l)}$?



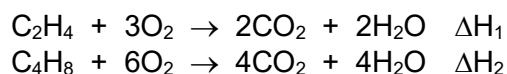
3 Consider the data in the table below

Substance	Standard enthalpy change of combustion / kJ mol^{-1}
hydrogen (g)	-300
carbon (s)	-400
benzene (l)	-3350

What is the standard enthalpy change of formation of liquid benzene calculated to be?

4 When 1.00 g of calcium is burned in oxygen to give CaO, the heat energy liberated is 15.9 kJ (at 25 °C and 1 atm). The standard enthalpy of formation of CaO is

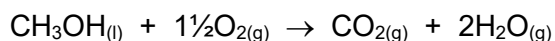
5 The enthalpies of combustion of ethene, C_2H_4 , and butene, C_4H_8 , are represented below as ΔH_1 and ΔH_2 .



What is the value for the enthalpy of the reaction of C_2H_4 to form C_4H_8 ?



6 Calculate the enthalpy change, ΔH , (in kJ mol^{-1}) for the reaction



using the enthalpies of formation, ΔH_f° , below

Compound	CH ₃ OH _(l)	CO _{2(g)}	H ₂ O _(g)
$\Delta H_f^\circ / \text{kJ mol}^{-1}$	-238.7	-393.5	-241.8

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- 7 The combustion of benzene, C_6H_6 , may be written as $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$
Using the information in the table, calculate the standard enthalpy change of combustion, ΔH_{comb} , for benzene in $kJ\ mol^{-1}$

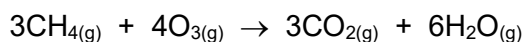
Compound	$\Delta H_f / kJ\ mol^{-1}$
$C_6H_6(l)$	+49
$CO_2(g)$	-393
$H_2O(l)$	-286

- 8 The enthalpy of combustion of butane, C_4H_{10} , is $-2877\ kJ\ mol^{-1}$. The enthalpy of formation of CO_2 is $-395\ kJ\ mol^{-1}$ and that of H_2O is $-286\ kJ\ mol^{-1}$. What is the enthalpy of formation of butane in $kJ\ mol^{-1}$?

- 9 Some standard heats of formation, ΔH_f° , are as follows:

Compound	$\Delta H_f / kJ\ mol^{-1}$
$CH_4(g)$	-74.8
$CO_2(g)$	-394
$H_2O(g)$	-242
$O_3(g)$	+143

What is ΔH° , in kJ for the reaction



- 10 All of the following have a standard heat of formation of zero at $25\ ^\circ C$ and $1.00\ atm$, **except**

A $Br_2(l)$ B $I_2(s)$ C $H_2O(l)$ D $He(g)$

- 11 Given the following enthalpies of formation

	$\Delta H_f / kJ\ mol^{-1}$
$CaBr_{2(s)}$	-682.8
$Ca^{2+}_{(g)}$	1925.9
$Br^{-}_{(g)}$	-233.9

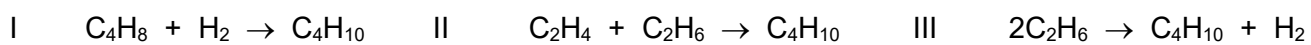
What is the value of ΔH (in $kJ\ mol^{-1}$) for the reaction: $CaBr_{2(s)} \rightarrow Ca^{2+}_{(g)} + 2Br^{-}_{(g)}$

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12 The standard enthalpy changes of formation of four compounds are given below

	C ₂ H ₄	C ₂ H ₆	C ₄ H ₈	C ₄ H ₁₀
ΔH _f /kJ mol ⁻¹	+50	-85	-10	-125

Which of the following reactions are exothermic?



13 Calculate the standard enthalpy of formation of ethene (C₂H_{4(g)}) given the following data: [3]

	ΔH _{combustion} /kJ mol ⁻¹
C _(s)	-394
H _{2(g)}	-286
H ₂ C=CH _{2(g)}	-1393