

## Standard Enthalpy Change of Combustion

Given the R.A.M. of H = 1; C = 12; O = 16; S = 32

Write chemical equations for the following enthalpy changes.

1.  $\Delta H_c^\ominus[\text{H}_2(\text{g})] = -286 \text{ kJ mol}^{-1}$
2.  $\Delta H_c^\ominus[\text{CO}(\text{g})] = -283 \text{ kJ mol}^{-1}$
3.  $\Delta H_c^\ominus[\text{H}_2\text{S}(\text{g})] = -561 \text{ kJ mol}^{-1}$
4.  $\Delta H_c^\ominus[\text{CH}_3\text{COCH}_3(\text{l})] = -1817 \text{ kJ mol}^{-1}$
5.  $\Delta H_c^\ominus[\text{S}(\text{s})] = -297 \text{ kJ mol}^{-1}$

Which of them will give out the largest amount of heat energy per g? Show your calculation.

## Suggested Answer

	Equation	Formula mass	No. of mole	Energy released per g (kJ)
1.	$\text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \longrightarrow \text{H}_2\text{O}(\text{l})$	2	0.5	$= 286 \times 0.5 = 143.0$
2.	$\text{CO}(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g})$	28	0.0357	10.11
3.	$\text{H}_2\text{S}(\text{g}) + 1\frac{1}{2}\text{O}_2(\text{g}) \longrightarrow \text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$	34	0.0294	16.50
4.	$\text{CH}_3\text{COCH}_3(\text{l}) + 4\text{O}_2(\text{g}) \longrightarrow 3\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l})$	58	0.0172	31.33
5.	$\text{S}(\text{s}) + \text{O}_2(\text{g}) \longrightarrow \text{SO}_2(\text{g})$	32	0.0313	9.28