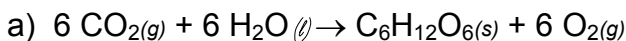


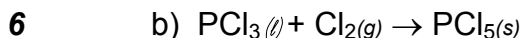
1. Predict (do not calculate) whether ΔS will be positive or negative, **and explain** your answer:



Predict a negative ΔS (entropy is decreasing; system becomes more ordered/less random)

Provide at least one explanation

- 1. gases and liquids produce a solid*
- 2. 12 moles produces 7 moles – fewer moles is a more ordered state*

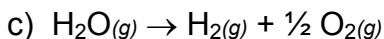


Predict $-\Delta S$ (entropy decreases; the system becomes more ordered / less random)

Provide at least one explanation:

- 1. 2 moles on the reactant side produce 1 mole; fewer moles is a more ordered state*
- 2. a liquid and gas produce a more ordered (less random) solid*

(2 marks each)

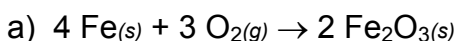


Predict $+\Delta S$ (entropy increases; the system becomes more random / less ordered)

Provide at least one explanation:

- 1. 1 moles produces 1½ moles (not much difference)*
- 2. this is a decomposition reaction, generally producing a more random product*

2. Calculate ΔS using values from the *Thermochemical Data* handout.



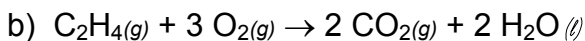
$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

a.	4Fe (s)	+	3 O ₂ (g)	→	2 Fe ₂ O ₃ (s)
	4(27.8)	+	3 (205.1)		2(87.4)
	111.2	+	615.3		
			726.5		174.8

$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

$$\Delta S = 174.8 - (726.5) = \underline{\underline{-551.7 \text{ J/K}\cdot\text{mol}}}$$

3

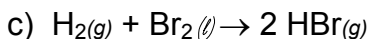


	$\text{C}_2\text{H}_4(g)$	+	$3 \text{O}_2(g)$	→	$2 \text{CO}_2(g)$	+	$2 \text{H}_2\text{O}(l)$
	219.6		+ 3 (205.1)		2(213.7)		+ 2 (69.9)
	219.6		+ 615.3		427.4		+ 139.8
			834.0				567.2

3

$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

$$\Delta S = 567.2 - (834.0) = \underline{-267.7 \text{ J/K}\cdot\text{mol}}$$

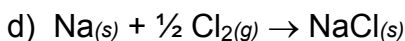


	$\text{H}_2(g)$	+	$\text{Br}_2(g)$	→	$2 \text{HBr}(g)$
	130.7		+ 151.6		2(198.7)
			282.3		397.4

3

$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

$$\Delta S = 397.4 - (282.3) = \underline{115.1 \text{ J/K}\cdot\text{mol}}$$

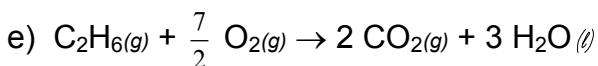


	$\text{Na}(s)$	+	$\frac{1}{2} \text{Cl}_2(g)$	→	$\text{NaCl}(s)$
	57.2		+ $\frac{1}{2}$ (223.1)		
			162.75		72.1

3

$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

$$\Delta S = 72.1 - (162.8) = \underline{-90.7 \text{ J/K}\cdot\text{mol}}$$



$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

	$\text{C}_2\text{H}_6(g)$	+	$\frac{7}{2} \text{O}_2(g)$	→	$2 \text{CO}_2(g)$	+	$3 \text{H}_2\text{O}(l)$
	229.6		+ $\frac{7}{2}$ (205.1)		2(213.7)		+ 3 (69.9)
			947.5				637.6

3

$$\Delta S = \Sigma \Delta S_{\text{products}} - \Sigma \Delta S_{\text{reactants}}$$

$$\Delta S = 637.6 - (947.5) = \underline{-310.4 \text{ J/K}\cdot\text{mol}}$$