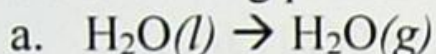


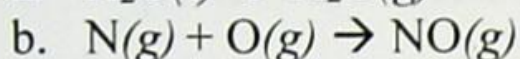
Thermo II HW

Worksheet Key

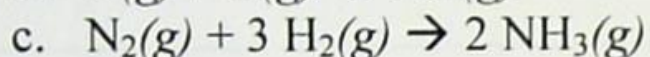
1) Do the following processes produce an increase or a decrease in entropy?



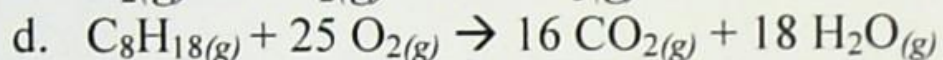
Increase – liquid to gas



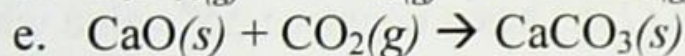
Decrease – fewer moles



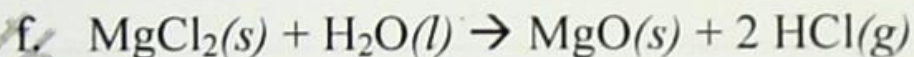
Decrease – fewer moles



Increase – more moles

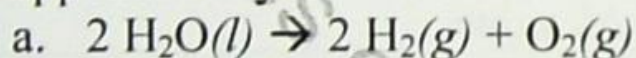


Decrease – fewer moles and gas to solid



Increase – more moles and two moles of gas on the products side.

2) Find the entropy change, ΔS° , for the following reactions using the S° values in the appendix of your textbook.



$$\Delta H^\circ = + 572 \text{ kJ}$$

$$\Delta S^\circ_{\text{rxn}} = \sum S^\circ_{\text{products}} - \sum S^\circ_{\text{reactants}}$$

$$\Delta S^\circ_{\text{rxn}} = [2(S^\circ \text{H}_{2(g)}) + (S^\circ \text{O}_{2(g)})] - [2(S^\circ \text{H}_2\text{O}_{(l)})]$$

$$\Delta S^\circ_{\text{rxn}} = [2(131 \text{ J/K}) + (205 \text{ J/K})] - [2(69.9 \text{ J/K})]$$

$$\Delta S^\circ_{\text{rxn}} = +327 \text{ J/molK}$$

#2

Three out of the four answers correct. Identify which one is not.

- a. $+327 \text{ J/mol}\cdot\text{K}$
- b. $-1087.4 \text{ J/mol}\cdot\text{K}$
- c. $-89 \text{ J/mol}\cdot\text{K}$
- d. $-387 \text{ J/mol}\cdot\text{K}$

#3

While the reactants are the same, notice the difference in the products.

Use this as part of your explanation.

#4

Three out of the four answers are correct. Identify which one is not.

- a. 475 kJ/mol
- b. -2972.8 kJ/mol
- c. -1379 kJ/mol
- d. 1432 kJ/mol

Be sure to identify if they are spontaneous or non-spontaneous

#5

When something “becomes spontaneous” G changes from positive to negative. Therefore, we can set $G=0$ and solve for temperature

$$G = H - TS$$

$$0 = H - TS$$

$$H = TS$$

(Get H and S from #2)

Answer 1750 K or 1477 C

#6

There are two forces that determine whether a system is spontaneous—enthalpy and entropy.

If one is not favored, the other must be to produce a spontaneous reaction.

Think about this as you construct your response.

#7

In the notes, we discussion dissolved of an ionic solid.

#8

Textbook required

- a. -632 kJ/mol
- b. Look at the states of matter, then at the number of particles to decide if S is positive or negative.
- c. Based on the sign you assigned to S (b) and the sign on G , you should be able to predict the sign on H (use the chart).

#9

Textbook required.

- a. +890.7 kJ/mol
- b. Look at the states of matter as well as the number of particles to determine the sign on S.

#10

- a. Look at the states of matter as well as the number of particles to determine the sign on S .
- c. Use the chart that we constructed to aid your response.

#11

- a. Look at the states of matter as well as the number of particles to determine the sign on S .
- c. Use the chart that we constructed to aid your response.

#12

Use $G = H - TS$ to solve for S. Watch your units
150 J/molK

Remember that two forces can drive a reaction, the one that is FAVORABLE will be the driving force.

--Exothermic is favored (Enthalpy)

--Increase in disorder is favored (Entropy)

For c, use your values for H and S and the chart we constructed.

#13

Use $G = H - TS$ to solve for H . Watch your units.

192 kJ/mol

#14

Use $G = H - TS$ to solve for H. Watch your units.
-65 kJ/mol

Remember that two forces can drive a reaction, the one that is FAVORABLE will be the driving force.

--Exothermic is favored (Enthalpy)

--Increase in disorder is favored (Entropy)

For c, use your values for H and S and the chart we constructed.

#15

Use $G = H - TS$ to solve for S. Watch your units.

194 J/molK

#16

Magnitude? This means to predict whether you think that the change in entropy is a large positive, large negative, small positive, small negative, or number close to zero.

