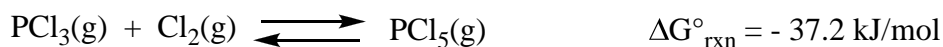


**Problem of the Day 40**      **CHEM 1252**

1. Consider the following reaction.



a) Is the entropy change for this reaction greater than or less than zero?

greater than zero	less than zero	6
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b) What is the equilibrium constant for the reaction at 25°C? Hint:  $\Delta G^\circ = -RT \ln K$

4

c) What is the equilibrium constant for the reaction at 425 °C? Assume  $\Delta G^\circ$  is independent of temperature.

4

d) Did the equilibrium constant increase, decrease, or remain the same when the temperature changed from 25°C to 425 °C?

<i>Circle One</i>	<i>increase</i>	<i>decrease</i>	<i>remain the same</i>	1
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e) Using Le Chatelier's Principle and your answer to part (a), is this reaction endothermic or exothermic?

<p><i>Circle One</i></p> <p style="text-align: center; padding: 10px 0 10px 20px;">exothermic</p> <p style="text-align: center; padding: 10px 0 10px 20px;">endothermic</p> <div style="text-align: right; border: 1px solid black; width: 30px; height: 30px; margin-left: auto; margin-top: -10px;">2</div>	<p><i>Justification:</i></p> <div style="border: 1px solid black; height: 150px; width: 100%;"></div> <div style="text-align: right; border: 1px solid black; width: 30px; height: 30px; margin-left: auto; margin-top: -10px;">2</div>
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2. A certain reaction is spontaneous only at high temperatures. What can be inferred about the signs of  $\Delta H^\circ$  and  $\Delta S^\circ$  for this process?

4

3. Lead (II) chloride is slightly soluble in water and its corresponding  $K_{sp}$  at  $25^\circ\text{C}$  is given below



a) What is  $\Delta G^\circ$  for this process at 298 K?

5

b) Is it possible to prepare a solution that is 1 M in both aqueous lead (II) and chloride ions? *You must justify your answer.*

3

4. Predict if  $\Delta S^\circ_{\text{rxn}}$  is greater than, less than, or about zero for the following processes.

Reaction	$\Delta S^\circ_{\text{rxn}}$	
$3 \text{NO}(\text{g}) \longrightarrow \text{N}_2\text{O}(\text{g}) + \text{NO}_2(\text{g})$	$\Delta S^\circ_{\text{rxn}}$	2
$\text{N}_2(\text{g}) + 3 \text{F}_2(\text{g}) \longrightarrow 2 \text{NF}_3(\text{g})$	$\Delta S^\circ_{\text{rxn}}$	2
$\text{P}_4(\text{s}) + 5 \text{O}_2(\text{g}) \longrightarrow \text{P}_4\text{O}_{10}(\text{s})$	$\Delta S^\circ_{\text{rxn}}$	2
$\text{C}_6\text{H}_{12}\text{O}_6(\text{s}) + 6 \text{O}_2(\text{g}) \longrightarrow 6 \text{CO}_2(\text{g}) + 6 \text{H}_2\text{O}(\text{g})$	$\Delta S^\circ_{\text{rxn}}$	2