Gibbs Free Energy

Apprentice Difficulty Level
Question 1
Consider: $N_{2(g)} + O_{2(g)} ==> 2 NO_{(g)}$
for which.   ΔH = +180.5 kJ   and.   ΔS = +421.5 J/K
Use the enthalpy change and entropy change values to complete the table:

Temp. (°C)	Temp. (Kelvin)	ΔS kJ/K	ΔG (kJ)	Spontaneous? Yes or No
25				
120				
180				
500				

Question 2
Consider: $N_{2(g)} + O_{2(g)} ==> 2 NO_{(g)}$
for which.   ΔH = +180.5 kJ   and.   ΔS = +421.5 J/K
Use the enthalpy change and entropy change values to complete the table:

Temp. (°C)	Temp. (Kelvin)	ΔS kJ/K	ΔG (kJ)	Spontaneous? Yes or No
0				
100				
200				
400				

Question 3

Consider: $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$

for which. $\Delta H = +178.3$ kJ   and $\Delta S = +160.5$ J/K

Use the enthalpy change and entropy change values to complete the table.

Temp. (°C)	Temp. (Kelvin)	ΔS kJ/K	ΔG (kJ)	Spontaneous? Yes or No
100				
400				
800				
1200				

Question 4

Consider: $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$

for which. $\Delta H = +178.3$ kJ   and $\Delta S = +160.5$ J/K

Use the enthalpy change and entropy change values to complete the table.

Temp. (°C)	Temp. (Kelvin)	ΔS kJ/K	ΔG (kJ)	Spontaneous? Yes or No
250				
500				
750				
1000				

Master Difficulty Level
Question 5
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-250	-450	250		
-250	-450	350		
-250	-450	550		
+250	+450	250		
+250	+450	550		

Question 6
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-250	-550	50		
-250	-550	150		
-250	-550	250		
+250	+550	150		
+250	+550	250		

Question 7
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-150	-350	50		
-150	-350	150		
-150	-350	250		
+150	+350	50		
+150	+350	250		

Question 8
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-150	-450	25		
-150	-450	125		
-150	-450	225		
+150	+450	25		
+150	+450	225		

Question 9
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-225	-450	125		
-225	-450	275		
-225	-450	425		
+225	+450	125		
+225	+450	425		

Question 10
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS J/K	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-275	-450	225		
-275	-450	325		
-275	-450	425		
+275	+450	225		
+275	+450	425		

Wizard Difficulty Level
Question 11
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-141		25	-26.8	
	+198	122	+38.6	
	-244	720	-11.3	
+421	-67.5	-33		
+411	+353		0.0	At Equilibrium

Question 12
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-129		55	-42.8	
	+125	145	+22.7	
	-176	788	-8.3	
+355	-52.1	-55		
+368	+412		0.0	At Equilibrium

Question 13
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-163		39	-17.1	
	+108	133	+12.7	
	-198	866	-4.3	
+349	-38.1	-71		
+412	+468		0.0	At Equilibrium

Question 14
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-129		32	-27.1	
	+106	121	+18.5	
	-132	425	-8.3	
+217	-29.4	-48		
+322	+608		0.0	At Equilibrium

Question 15
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-181		42	-17.6	
	+172	151	+17.5	
	-455	412	-6.3	
+384	-49.7	-48		
+322	+568		0.0	At Equilibrium

Question 16
Use the Gibb's Free Energy equation to complete the following table.

ΔH (kJ)	ΔS (J/K)	Temp. (°C)	ΔG (kJ)	Spontaneous? Yes or No
-321		21	-27.2	
	+588	65	+12.3	
	-427	325	-14.8	
+325	-145	-45		
+268	+649		0.0	At Equilibrium