***Chemistry***

**16: Thermodynamics**

**16.3: The Second and Third Laws of Thermodynamics**

21. Calculate  for the following changes.

(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

(g) 

Solution

(a)



(b)



(c)



(d)



(e) ; (f)



(g)



23. Determine the entropy change for the combustion of gaseous propane, C3H8, under the standard conditions to give gaseous carbon dioxide and water.

Solution

The reaction is .



25. Using the relevant  values listed in Appendix G, calculate  for the following changes:

(a) 

(b) 

Solution

(a) 



;

(b) 





27. By calculating Δ*S*univ at each temperature, determine if the melting of 1 mole of NaCl(*s*) is spontaneous at 500 °C and at 700 °C.



What assumptions are made about the thermodynamic information (entropy and enthalpy values) used to solve this problem?

Solution

The process is .

At 500 °C, the following is true: 

At 700 °C, the following is true: 

As Δ*S*univ < 0 at each of these temperatures, melting is not spontaneous at either of them. The given values for entropy and enthalpy are for NaCl at 298 K. It is assumed that these do not change significantly at the higher temperatures used in the problem.

29. Use the standard entropy data in Appendix G to determine the change in entropy for each of the reactions listed in Exercise 6. All the processes occur at the standard conditions and 25 °C.

Solution

(a) 



(b) 



(c) 



(d) 



(e) 



(f) 



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