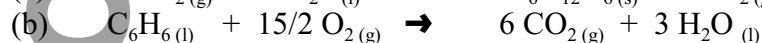


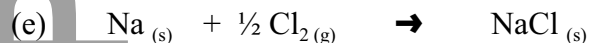
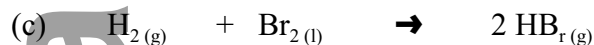
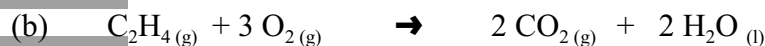
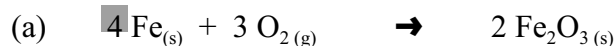
# Assignment I: ENTROPY

1. Define the term spontaneous as it applies to (a) everyday life, (b) chemistry.
- 2.a. Spontaneity depends on what two thermodynamic factors? Discuss the influence of each of these factors on the direction of chemical change and describe how they are combined in a new function to predict such change.
- 2.b. Use these ideas to explain why the solubility of solids in water usually increases with increasing temperature, whereas the solubility of gases decreases with increasing temperature.

3. Predict whether the entropy change for each of the following reactions is a positive or a negative quantity.



4. Using the values of  $S^\circ$  from the Table of thermodynamic data provided to calculate  $\Delta S^\circ$  for the following reactions:



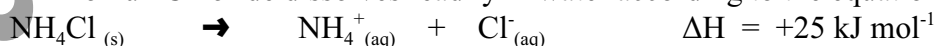
5. Given that  $\Delta S^\circ$  for the combustion of glucose :



at 25 °C is +257.6 J.K<sup>-1</sup>, calculate the absolute entropy,  $S^\circ$ , for glucose using other values for  $S^\circ$ .

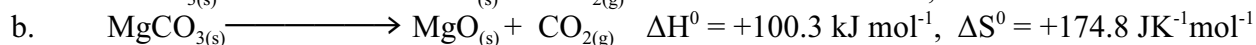
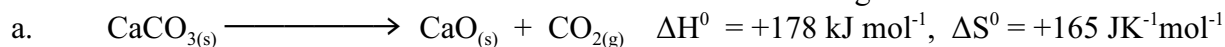
6. A certain reaction is spontaneous below 100 °C, but is non-spontaneous at higher temperatures. Based on this information, what are the signs of  $\Delta H$  and  $\Delta S$ ?

7. Ammonium Chloride dissolves readily in water according to the equation:



Explain in terms of enthalpy and entropy, which of these factors contribute to the occurrence of this process?

8. Use  $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$  to calculate  $\Delta G^\circ$  for the following two reactions:



Compare the thermal stability of magnesium carbonate with that of calcium carbonate. Suggest a reason for the difference in thermal stability between the two compounds.