

Name :

Honors Chemistry

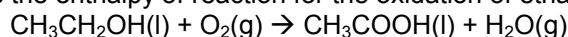
Section :

Hess' Law

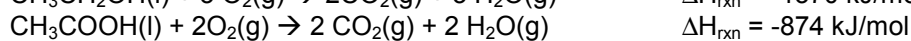
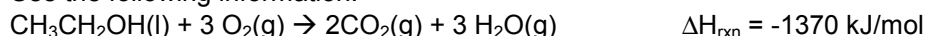
Some reactions may be too slow, explosive, or have many side reactions making it impractical to directly measure the enthalpy of reaction. Hess' Law enables chemists to measure the enthalpy of a reaction that cannot be measured directly in the laboratory.

Enthalpy is a state function because it is independent of the reaction pathway. According to Hess' Law, the enthalpy change for a reaction is the sum of the enthalpy changes for a series of reactions that add up to the overall reaction.

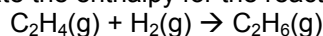
1. What is the enthalpy of reaction for the oxidation of ethanol to acetic acid?



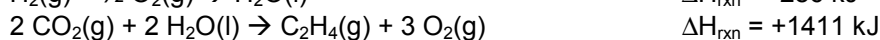
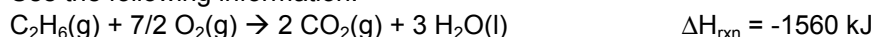
Use the following information:



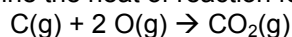
2. Calculate the enthalpy for the reaction given below.



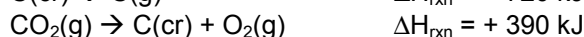
Use the following information:



3. Determine the heat of reaction for the formation of carbon dioxide from its elements.



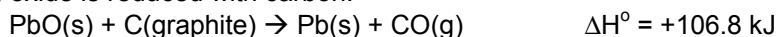
The following information is available to you:



4. Lead has been known and used since ancient times. To obtain the metal, the ore PbS (galena), is first heated in air to form PbO,



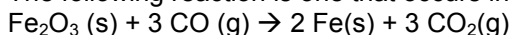
and the lead (II) oxide is reduced with carbon.



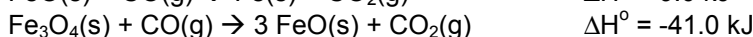
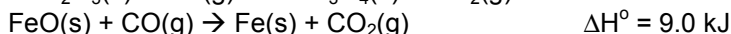
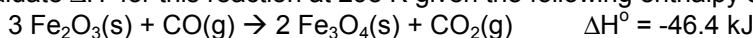
To obtain the lead from 1.00 kg of pure PbS, how much heat energy is required or evolved (at constant pressure)?

CHALLENGE PROBLEMS

5. The following reaction is one that occurs in a blast furnace when iron is extracted from its ores.

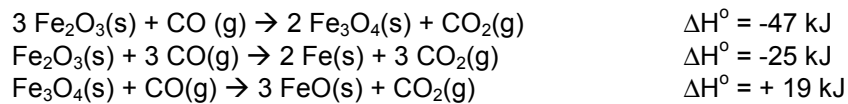


Evaluate ΔH° for this reaction at 298 K given the following enthalpy changes at 298K.



6. One reaction involved in the conversion of iron ore to the metal is
 $\text{FeO(s)} + \text{CO(g)} \rightarrow \text{Fe(s)} + \text{CO}_2\text{(g)}$

Calculate the enthalpy change for this reaction using the following reactions of iron oxides with CO:



Answers.

1. -496 kJ/mol
2. -137 kJ/mol
3. -1360 kJ/mol
4. 1280 kJ released
5. -24.8 kJ
6. -11 kJ