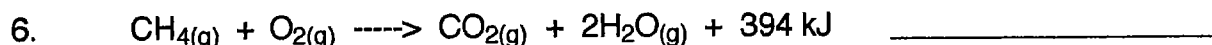
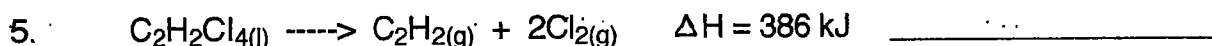
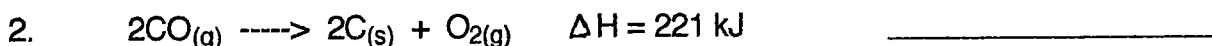


Enthalpy

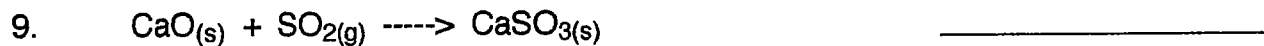
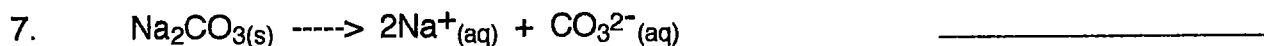
In any chemical reaction, the side having **minimum enthalpy** (minimum energy) is said to be favoured because molecules tend to go to or remain at a state of minimum energy. Thus, there is a tendency for **exothermic reactions** to be **spontaneous**. Note that a spontaneous change is a change which occurs by itself, without outside assistance.

For each of the following reactions, decide whether the **reactants** or the **products** have the lesser enthalpy (energy) and would therefore be favoured:

**Entropy**

In all chemical and physical changes there is a tendency for the system to attain a state of **maximum entropy** or randomness. The randomness of phases from greatest to least is: **gases >> solutions > liquids >> solids**. In general, the side of the equation favoured is the side having the most particles of the most random phase.

For each of the following reactions, decide whether the **reactants** or the **products** have the greater entropy and would therefore be favoured. There may also be **no significant change**.



For each of the following reactions, use enthalpy and entropy considerations to decide whether a reaction in the direction shown will be **spontaneous**, reach a state of **equilibrium**, or **not occur**. Assume that the system is closed.



enthalpy favours _____

entropy favours _____

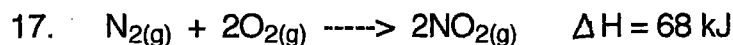
_____ answer



enthalpy favours _____

entropy favours _____

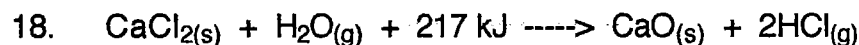
_____ answer



enthalpy favours _____

entropy favours _____

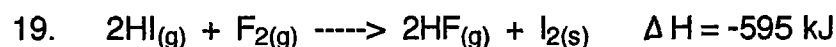
_____ answer



enthalpy favours _____

entropy favours _____

_____ answer



enthalpy favours _____

entropy favours _____

_____ answer



enthalpy favours _____

entropy favours _____

_____ answer

This is different: Predict whether the equilibrium $4\text{HCl}_{(g)} + \text{O}_2_{(g)} \text{<-----} \rightarrow 2\text{H}_2\text{O}_{(g)} + 2\text{Cl}_2_{(g)}$ is exothermic or endothermic and explain your reasoning.