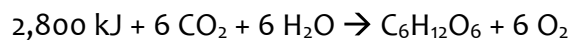


## Thermochemistry Whiteboard Challenge

\*No notes or booklets allowed!\*

1. Glucose ( $C_6H_{12}O_6$ ) can be formed in the cells of green plants through an endothermic reaction of carbon dioxide and water. This process, known as photosynthesis, occurs using energy provided by the sun.



- a) In the process of photosynthesis, which requires a greater magnitude of energy: breaking bonds or forming bonds? Explain.
- b) What is the enthalpy value for photosynthesis,  $\Delta H_{\text{rxn}}$ , in kJ/mol?
- c) A student completes this reaction in a calorimeter, using a sun lamp for their energy source. In their first trial, 1.72 g of carbon dioxide reacted with excess water, and the student monitored the temperature of the reaction mixture throughout. The initial temperature of the solution in the calorimeter is  $28.3^\circ\text{C}$ .
- i) How much heat will be absorbed or released during this reaction?
- ii) Determine the temperature change of the calorimeter solution. (Assume the total mass of the calorimeter, including the reacting chemicals, is 245 g and the specific heat of solution is  $4.18 \text{ J/g}^\circ\text{C}$ ).
- iii) What would the final temperature in the calorimeter be after the reaction?