

# Chemistry 2201 Lab: BOMB

Determining heat of combustion( $\Delta H_{\text{comb}}$ )  
of sucrose and thus  $\Delta H_f$  for sucrose.

Must determine heat of combustion using  
bomb calorimeter.

Constant Volume

$$q_{\text{COMB}} = \Delta U_{\text{COMB}}$$

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$$q_{\text{CAL}} = C_{\text{CAL}}\Delta T$$

$$q_{\text{CAL}} = -q_{\text{COMB}}$$

**Part I: Determining  $C_{\text{CAL}}$  using benzoic acid.**

$$-q_{\text{COMB}} = -q_{\text{BA}} + -q_{\text{WIRE}}$$

**Measure  $\Delta T$  and get  $C_{\text{CAL}}$ .**

# Chemistry 2201 Lab: BOMB

**Part II: Measure  $\Delta T$  for sucrose run and use  $C_{\text{CAL}}$  from benzoic acid run to determine  $-q_{\text{COMB}}$ .**

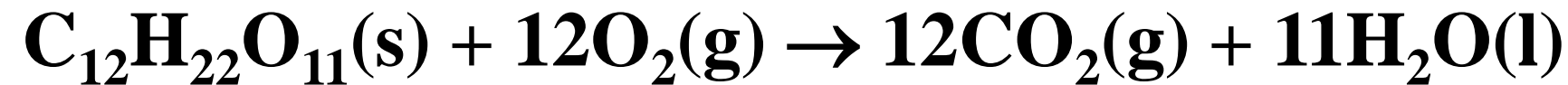
$$-q_{\text{SUCROSE}} = -q_{\text{COMB}} + q_{\text{WIRE}}$$

$$q_{\text{SUCROSE}} = \Delta U_{\text{comb}} \text{ for sucrose.}$$

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To determine  $\Delta H_{\text{COMB}}$ .

$$\Delta H = \Delta U + \Delta n_{\text{gas}}RT$$

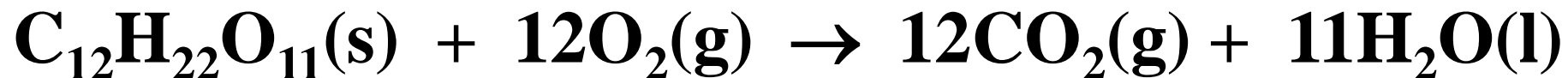


$$\Delta n_{\text{gas}} = 12 \text{ mol} - 12 \text{ mol} = 0$$

Convert  $\Delta H_{\text{COMB}}$  to  $\Delta H^\circ_{\text{COMB}}$ .

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To determine  $\Delta H_f^\circ$ .



$$\Delta H_f^\circ[\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s})] = 12\Delta H_f^\circ[\text{CO}_2(\text{g})] + 11\Delta H_f^\circ[\text{H}_2\text{O}(\text{l})] - \Delta H_{\text{comb}}^\circ$$