Weekly Quiz 6 take-home CHEM122/124 due April 3, 2019 Name:_____

1) What is the ΔH_{RXN} for the reaction to make carbon monoxide, CO (g), and hydrogen gas H_2 (g) from water, H_2O (l), and methane gas, CH_4 (g); Show your work! (6 pts)

CH_4 (g) + H_2O (l) → CO (g) + 3 H_2 (g)

Given the following reactions:

2 CO (g) + O_2 (g) → 2 CO_2 (g)	ΔH_{RXN} = -566.0 kJ (Rxn 1)
2 H_2 (g) + O_2 (g) → 2 H_2O (g)	ΔH_{RXN} = -483.6 kJ (Rxn 2)
CH_4 (g) + 2 O_2 (g) → CO_2 (g) + 2 H_2O (g)	ΔH_{RXN} = -836.3 kJ (Rxn 3)
H_2O (l) → H_2O (g)	ΔH_{VAP} = +44.0 kJ/mol (Rxn 4)

ΔH_{RXN} = _____

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2) A 2.095 g sample of glucose, $C_6H_{12}O_6$, which has a molar mass of 180.16 g/mol, is analyzed in a bomb calorimeter at constant volume in order to measure its heat of combustion. The heat flows from the reaction into the calorimeter and the water. (9 pts)

$$C_6H_{12}O_6\ (s) + 6\ O_2\ (g) \rightarrow 6\ CO_2\ (g) + 6\ H_2O\ (l)$$

The calorimeter alone has a heat capacity (also called calorimeter constant) of 857 J / °C.
It also contains 1062 g of water which has a specific heat of 4.184 J/g °C.
The initial temperature of the calorimeter and water is 25.267 °C.
After the sample is combusted, the final temperature rises to 31.416 °C.

A) Find the heat flow, q_{water}, to or from the water. Be sure to include the correct sign for q.

B) Find the heat flow, $q_{calorimeter}$, to or from the calorimeter. Be sure to include the correct sign for q.

C) Find the heat flow, $q_{combust}$, to or from the combustion reaction of the sample of glucose.

D) Find the heat of combustion in kilojoules (kJ) per mole of glucose combusted.

E) Which state function corresponds to the answer from part D? Explain briefly.

ΔH_{RXN} ΔU_{RXN}