AP Chemistry
Student Name _____

Instructions: Complete all the following questions regarding Thermochemistry (chapter 6).

7. Answer the following questions about thermodynamics.

Substance	Combustion Reaction	Enthalpy of Combustion, ΔH°_{comb}, at 298 K (kJ mol^{-1})
$H_2(g)$	$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$	–290
$C(s)$	$C(s) + O_2(g) \rightarrow CO_2(g)$	–390
$CH_3OH(l)$		–730

(a) In the empty box in the table above, write a balanced chemical equation for the complete combustion of one mole of $CH_3OH(l)$. Assume products are in their standard states at 298 K. Coefficients do not need to be whole numbers.

(b) On the basis of your answer to part (a) and the information in the table, determine the enthalpy change for the reaction $C(s) + H_2(g) + H_2O(l) \rightarrow CH_3OH(l)$.

(c) Write the balanced chemical equation that shows the reaction that is used to determine the enthalpy of formation for one mole of $CH_3OH(l)$.

(d) If 10 grams of CH_3OH were combusted in a bomb calorimeter and the temperature of the bomb increased by 45.0 degrees Celsius, what is the heat capacity of the calorimeter in units of kJ K^{-1}? Assume that $\Delta H = \Delta E = q_v$.