150.0g of water are placed in a calorimeter at 15.0°C. If 200.0 g of water at 85.0°C are added and the temperature rises to 48.0°C, what is the heat capacity of the calorimeter?

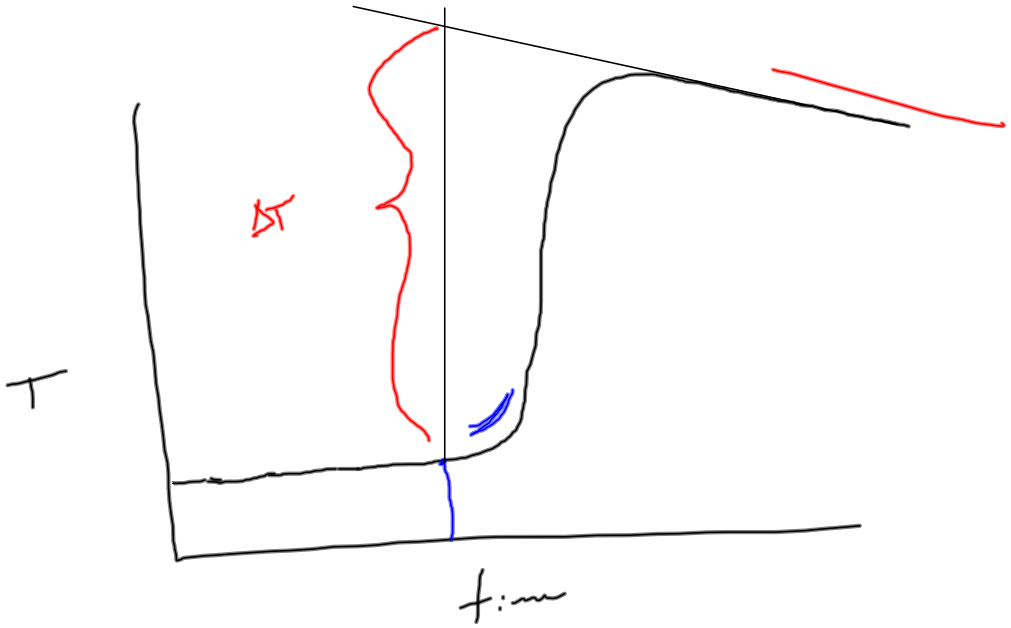
$(-1)\, q_h = q_{cold} + q_{calorimeter}$

$(-1)\, m_h c_h \Delta T_h = m_c c_c \Delta T_c + S \Delta T_c$

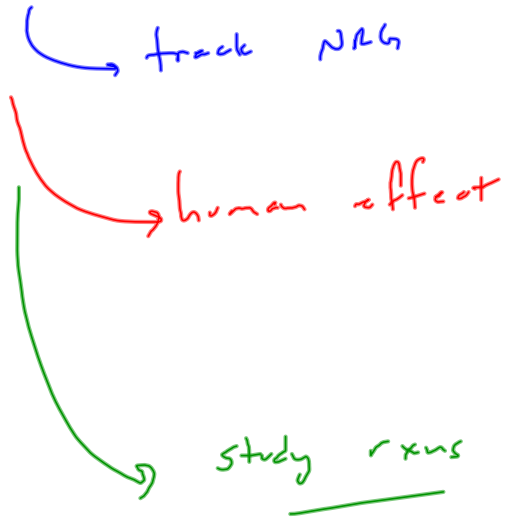
$(-1)(200.0\,g)\left(1\,\frac{cal}{g\cdot{}^\circ C}\right)(48.0 - 85.0) = (150.0\,g)\left(1\,\frac{cal}{g\cdot{}^\circ C}\right)(48.0 - 15.0) + S\,(48.0 - 15.0)$

$74.2\,\frac{cal}{{}^\circ C} = S$

Dealing with heat lost to the environment



Why do we need to measure heat?



Why do reactions give off (or take in) heat?

$$CH_4 + 2\,O_2 \longrightarrow CO_2 + 2\,H_2O$$

break

$4(C-H) + 2(O=O)$

NRG in

endo (+)

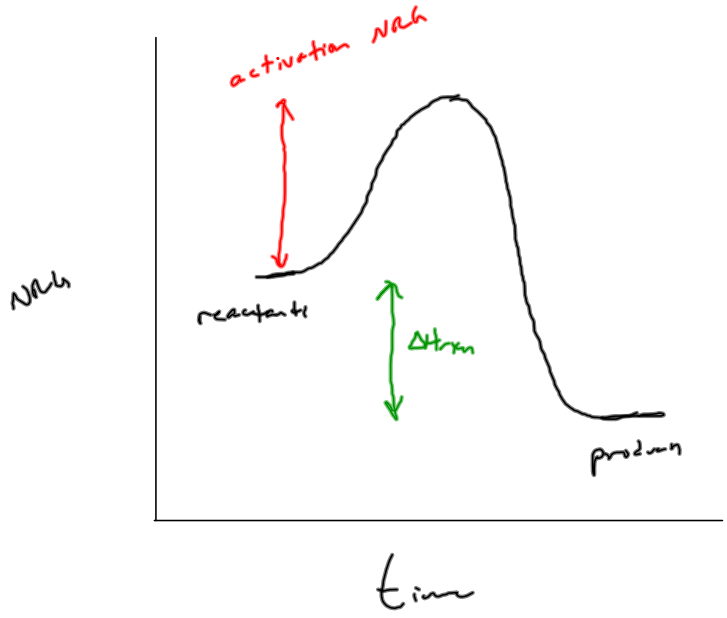
make

$2(C=O) + 4(O-H)$

NRG out

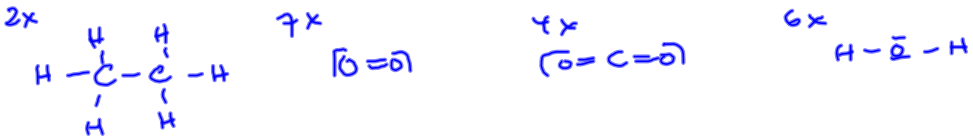
exo (−)

$$\Delta H_{rxn} = [4(413) + 2(498)] - [2(745) + 4(468)]$$



What is the heat of the following reaction?

$$2\ C_2H_6 + 7\ O_2 \longrightarrow 4\ CO_2 + 6\ H_2O$$



$$\{12(C-H) + 2(C-C) + 7(O=O)\} - [8(C=O) + 12(O-H)]$$

$$\Delta H = -2382\ \frac{kJ}{mol}$$

How much heat is released when 12.8 g of C_2H_6 react according the reaction below?

$$2\ C_2H_6 + 7\ O_2 \longrightarrow 4\ CO_2 + 6\ H_2O$$

$12.8\text{g } C_2H_6 \times \frac{1\text{ mol}}{\text{MM g}} \times \frac{2382\text{ kJ}}{1\text{ mol}}$