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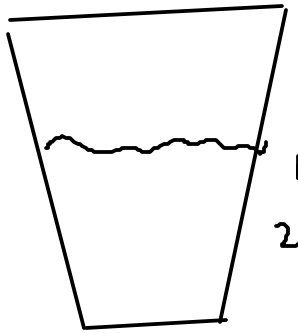
15.3 g $NaNO_3$



Heat cap = 1071 J/°C

25.00°C to 21.56°C

$Q_{cal} + Q_{rxn} = 0$

$Q_{cal} = 1071\ J/^{\circ}C\ (21.56^{\circ}C - 25.00)$

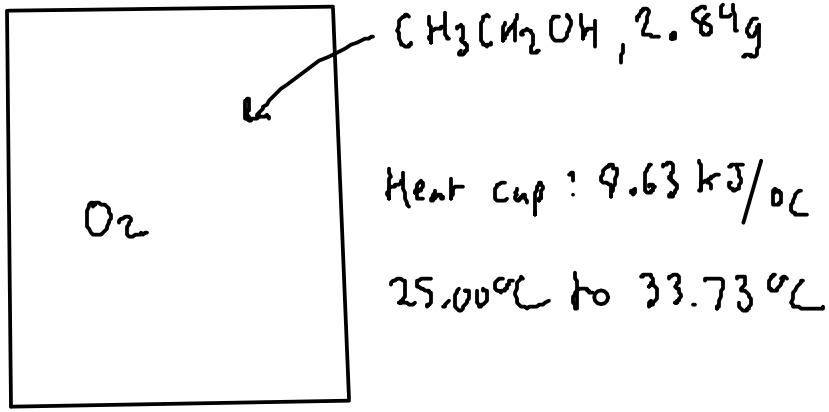
$= -3684.24\ J$

$Q_{rxn} = -(-3684.24\ J) = 3684.24\ J$ (endothermic)

$\Delta H = \dfrac{Q_{rxn}}{\#\ mol\ NaNO_3}$, so find mol $NaNO_3$

$15.3\ g\ NaNO_3 \times \dfrac{mol\ NaNO_3}{85.00\ g\ NaNO_3} = 0.180\ mol$

$\Delta H\ (per\ mole\ NaNO_3) = \dfrac{3684.24\ J}{0.180\ mol} = 20468\ J/mol = \boxed{20.5\ \dfrac{kJ}{mol}}$



$Q_{cal} + Q_{rxn} = 0$

$Q_{cal} = 9.63\ kJ/°C\ (33.73°C - 25.00°C)$

$= 84.0699\ kJ$

$Q_{rxn} = -84.0699\ kJ$ (exothermic)

... but we want heat per mol, so divide by # mol CH_3CH_2OH

$$2.84\ g\ CH_3CH_2OH \times \frac{mol\ CH_3CH_2OH}{46.068\ g\ CH_3CH_2OH} = 0.061647999\ mol\ CH_3CH_2OH$$

$$q = \frac{-84.0699\ kJ}{0.061647999\ mol} = \boxed{-1360\ kJ/mol}$$