1. H_2SO_4 dissolves — water heats

$\Delta H = q$

$nH = mc\Delta T$

$49g \times \frac{1mol}{98.07g} \times H = 175g \times 0.00418 \frac{kJ}{g°C} \times 4.9°C$

$H = 7.17\ kJ/mol$

2. $C_{18}H_{36}O_2$ comb — water

$\Delta H = q$

$nH = mc\Delta T$

$8.36g \times \frac{1mol}{284.54g} \times H = 1520g \times 0.00418 \frac{kJ}{g°C} \times 6.21°C$

$H = 1342.9\ kJ/mol$

3. C_6H_{14} comb — q_{water}

$\Delta H = q$

$nH = mc\Delta T$

$0.315\ moles \times H = 5650g \times 0.00418 \frac{kJ}{g°C} \times 55.4°C$

$H = 4153.59\ kJ/mol$

4. Propane Comb (C_3H_8) Water

ΔH q

$nH = mc\Delta T$

$22g \times \frac{1mol}{44.11g} \times H = 3250g \times 0.00418 \frac{J}{gC} \times 29.5°C$

$H = 803.5\ KJ/mol$

5. Melt Wax Water

ΔH_{fus} q

$nH = mc\Delta T$

$10.1g \times \frac{1mol}{19844g} \times H = 155g \times 4.18 \frac{J}{gC} \times 3°C$

$H = 38.19\ KJ/mol$

6. Combustion: ΔH | Water: q

$n\Delta H = mc\Delta T$

$0.285\,mol \times H = 3000\,g \times 0.00418\,\frac{J}{g°C} \times 36°C$

$H = 1584\,kJ/mol$

7. Comb: ΔH | water: q

$n\Delta H = mc\Delta T$

$0.875\,mol \times 1350\,\frac{kJ}{mol} = 1700\,g \times 0.00418\,\frac{kJ}{g°C} \times \Delta T$

$\frac{0.875\,mol \times 1350\,kJ/mol}{1700\,g \times 0.00418\,kJ/g°C} = \Delta T$

$166.23°C = \Delta T$

8. $\Delta H_{combustion} = q_{water}$

$nH = mc\Delta T$ $\left(4.18 \frac{J}{g^{\circ}C} = 0.00418 \frac{kJ}{g^{\circ}C}\right)$

$n \times 1160 \frac{kJ}{mol} = 500g \times 0.00418 \frac{kJ}{g^{\circ}C} \times 48^{\circ}C$

$n = 0.08648 \text{ moles}$

$\text{molar mass} = \frac{g}{mol} = \frac{62.3g}{0.08648 mol}$

$= 720.398 g/mol$