REVIEW AND PRACTICE 2
ANSWERS

1.

$$q = m c \Delta T$$
$$= (2.6 \times 10^7\ g)\left(4.18 \frac{J}{g\,^\circ C}\right)(27\,^\circ C - 19\,^\circ C)$$
$$= 8.6944 \times 10^8\ J$$
$$= 8.6944 \times 10^5\ kJ$$

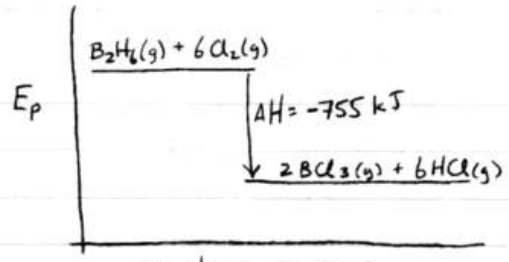
$\therefore$ 9×10^5 kJ of thermal energy must be added to the water.

2.

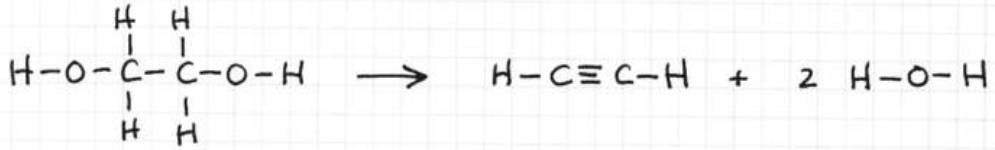
(a) $\Delta H_x = \dfrac{-755\ kJ}{6\ mol\ Cl_2}$

$= -126\ kJ/mol\ Cl_2$

(b)



3.



1 mol of C-C
4 mol of C-H
2 mol of C-O
2 mol of H-O

1 mol C≡C
2 mol C-H

4 mol H-O

$$\Delta H = 1\,mol\left(+347 \tfrac{kJ}{mol}\right) + 4\,mol\left(+413 \tfrac{kJ}{mol}\right) + 2\,mol\left(+358 \tfrac{kJ}{mol}\right)$$
$$+ 2\,mol\left(+467 \tfrac{kJ}{mol}\right) + 1\,mol\left(-839 \tfrac{kJ}{mol}\right)$$
$$+ 2\,mol\left(-413 \tfrac{kJ}{mol}\right) + 4\,mol\left(-467 \tfrac{kJ}{mol}\right)$$

$= +116$ kJ

4. $\Delta H = \sum n\Delta H_{f(\text{products})} - \sum n\Delta H_{f(\text{reactants})}$

$= \left[1\,\text{mol}\left(-1273.1\,\frac{\text{kJ}}{\text{mol}}\right)\right] - \left[6\,\text{mol}\left(-393.5\,\frac{\text{kJ}}{\text{mol}}\right) + 6\,\text{mol}\left(-285.8\,\frac{\text{kJ}}{\text{mol}}\right)\right]$

$= +2802.7\ \text{kJ}$

5.

② × 1	$N_2H_4(l) + O_2(g) \rightarrow N_2(g) + 2H_2O(l)$	$\Delta H = -622\ \text{kJ}$
① × −2	$2H_2O_2(l) \rightarrow 2H_2(g) + 2O_2(g)$	$\Delta H = -2(-188\ \text{kJ})$
③ × 2	$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$	$\Delta H = 2(-286\ \text{kJ})$

$N_2H_4(l) + 2H_2O_2(l) \rightarrow N_2(g) + 4H_2O(l)$

$\Delta H = (-622\,\text{kJ}) + (-2)(-188\,\text{kJ}) + 2(-286\,\text{kJ})$

$= -818\ \text{kJ}$

6.

$q = mc\Delta T$ (total of 100 mL of solution / assuming that the solution has same density as water)

$= (100\,\text{g})\left(4.18\,\frac{\text{J}}{\text{g°C}}\right)(27.3°\text{C} - 20.6°\text{C})$ (assuming the solution has same heat capacity as water)

$= 2800.6\ \text{J}$

$\Delta H = -q$ ← (assuming the system is isolated)

$= -2800.6\ \text{J}$

$n_{NaOH} = c \cdot V$

$= \left(1.0\,\frac{\text{mol}}{\text{L}}\right)(0.050\,\text{L})$

$= 0.050\ \text{mol}$

$\Delta H_{neut} = \frac{\Delta H}{n}$

$= \frac{-2800.6\,\text{J}}{0.050\ \text{mol}}$

$= -56012\ \frac{\text{J}}{\text{mol}}$

$= -56\ \text{kJ/mol}$