① DRO → check answer to vapor pressure problem

② $\Delta t = 30.5°C - 23.2°C = 7.3°C$

$q = cmt \rightarrow 9.86J = m \cdot \dfrac{0.90J}{g°C} \cdot 7.3°C \rightarrow \boxed{m = 1.50g}$

check → $q = 1.50g \cdot \dfrac{0.90J}{g°C} \cdot 7.3°C = 9.86 J$ ✓

④ $2HCl_{(g)} + F_{2(g)} \rightarrow 2HF_{(g)} + Cl_{2(g)}$

H—Cl̈   :F̈—F̈: → H—F̈:
H—Cl̈: + ⸪ ⸝⸝   + :Cl̈—Cl̈:
                              H—F̈:

↓   ↓   ↓   ↓
2 H—Cl   1 F—F bond   2 H—F   1 Cl—Cl bond
bonds broken   broken   bonds   formed
                            formed
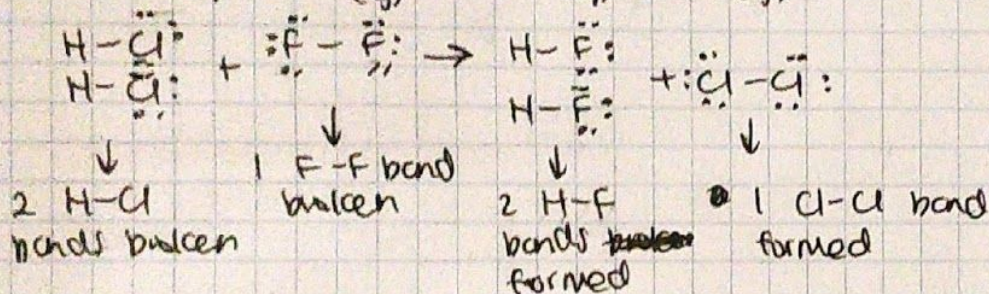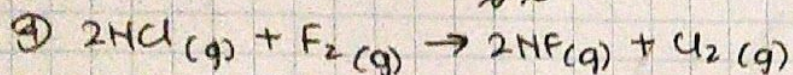
ΔH = bonds broken − bonds formed

$= 2(H-Cl) + 1(F-F) - 2(H-F) - 1(Cl-Cl)$
$= 2(431) + 1(155) - 2(567) - 1(242)$
$\boxed{\Delta H = -859 \text{ kJ/mol}_{rxn}}$

③　$8O_{2(g)} \rightarrow S_{(s)} + O_{2(g)}$　　$\Delta H = 297kJ$

$2SO_{2(g)} \rightarrow 2S_{(s)} + 2O_{2(g)}$　$\Delta H = 594kJ$

$2S_{(s)} + 3O_{2(g)} \rightarrow 2SO_{3(g)}$　$\Delta H = -790kJ$
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$2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$ $\boxed{\Delta H = -196 \text{ kJ/mol}_{rxn}}$

⑥　$NaOH_{(s)} \rightarrow Na^+_{(aq)} + OH^-_{(aq)}$ $\Delta H = -44.4 \text{ kJ/mol}_{rxn}$
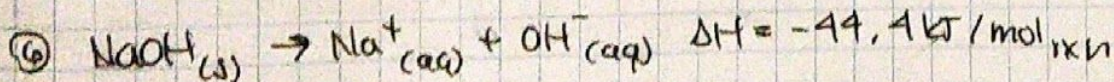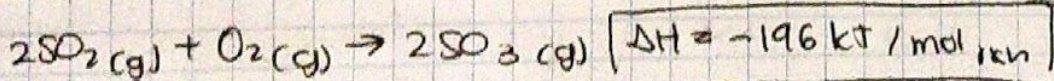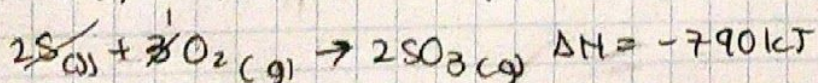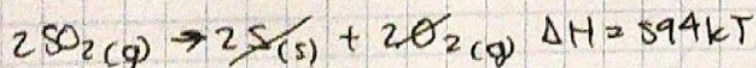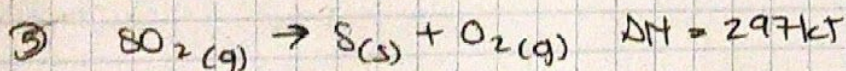
$13.9g\ NaOH_{(s)} \cdot \dfrac{mol\ NaOH_{(s)}}{39.99711\ g\ NaOH_{(s)}} \cdot \dfrac{-44.4\ kJ}{mol\ NaOH_{(s)}} = -15.43011\ kJ$ released by rxn into water

$15430 J = 280.0g \cdot \dfrac{4.184 J}{g°C} \cdot \Delta t$

$\Delta t = 14.75°C \rightarrow$ final temp $= 23.0°C + 14.8°C = \boxed{37.8°C}$