

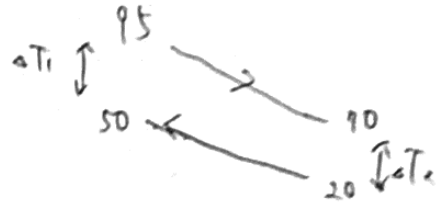
[A5]

(1) (a)  $Q_1 = 4.2 \times 2.57 \times (95 - T) = \underline{1025 - 10.8T}$   $\text{kJ/s}$

(b)  $Q_2 = 1.8 \times 5 \times (50 - 20) = \underline{270}$   $\text{kJ/s}$

(c)  $1025 - 10.8T = 270$

$T = \underline{69.9} \text{ } ^\circ\text{C}$



(d)  $\Delta T_{\text{em}} = \frac{\Delta T_1 - \Delta T_2}{\ln \frac{\Delta T_1}{\Delta T_2}}$

$= \frac{95 - 50}{\ln \frac{95}{50}} = 47.5 \text{ } ^\circ\text{C}$

$Q_3 = UA \Delta T_{\text{em}}$

$A = \frac{Q}{U \Delta T_{\text{em}}} = 1.895 \text{ m}^2 = \pi D_i L$

$L = \frac{A}{\pi D_i} = \underline{12.06} \text{ m}$

2) (e), (f) (1) は向流で、\*の出口温度は  $70^\circ\text{C}$  であらう。

よって 並流では (4)  $71.6^\circ\text{C}$  (5)  $76.7^\circ\text{C}$  となる

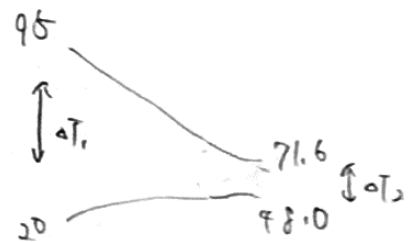
[試行法]

(4)  $71.6^\circ\text{C}$  と仮定

水:  $Q_1 = 1025 - 10.8 \times 71.6 = 251.7 \text{ kJ/s}$

油:  $Q_2 = 1.8 \times 5 \times (T - 20) = 251.7$   $T = 48.6^\circ\text{C}$

$\Delta T_{\text{em}} = \frac{\Delta T_1 - \Delta T_2}{\ln \frac{\Delta T_1}{\Delta T_2}} = \frac{95 - 23.6}{\ln \frac{95}{23.6}} = 44.5 \text{ } ^\circ\text{C}$



よって 熱交換器:  $Q_3 = UA \Delta T_{\text{em}}$

$= 252.9 \text{ kJ/s}$

$Q_1 = Q_2$  とする。よって水の出口温度は

(e)  $\underline{71.6}$  (f)  $\underline{48.6}$