Exp.1

P exp't	741.6	mmHg
d棉子油	0.918	g/ml
d_{Hg}	13.6	g/ml

Troom	26.5	°C
Proom	741.6	mmHg

60cm

	Run 1			Run 2		
	h_L	h_R	△h	h_L	h_R	△h
P_1	22.7	84.2	61.5	29.3	77.8	48.5
P_2	29.8	76.4	46.6	37.0	70.0	33.0
P_3	29.3	77.8	48.5	36.2	71.3	35.1

40cm

	Run 1			Run 2		
	h_L	h_R	△h	h_L	h_R	△h
P_1	36.2	71.3	35.1	41.9	65.7	23.8
P_2	42.8	64.5	21.7	47.7	59.4	11.7
P_3	41.9	65.7	23.8	47.1	60.4	13.3

60cm

	Run 1 (mmHg)		Run 2 (mmHg)	
	△h_{Hg}	P	△h_{Hg}	P
P_1	41.5	783.113	32.7	774.338
P_2	31.5	773.055	22.3	763.875
P_3	32.7	774.338	23.7	765.293
Cp/Cv	1.147		1.158	

40cm

	Run 1 (mmHg)		Run 2 (mmHg)	
	△h_{Hg}	P	△h_{Hg}	P
P_1	23.7	765.293	16.1	757.665
P_2	14.6	756.248	7.9	749.498
P_3	16.1	757.665	9.0	750.578
Cp/Cv	1.187		1.153	

Calculations

(1) 以 60cm, run1 為例

$$\mathrm{P} = \mathrm{P}_{room} + \Delta h \times \frac{d_{棉仔油}}{d_{Hg}} \times 10$$

$$= 741.6\ (\mathrm{mmHg}) + 61.5 \times \frac{0.918}{13.6} \times 10$$

$$= 783.113\ (mmHg)$$

$$\frac{\bar{C}_p}{\bar{C}_v} = \frac{\log(\frac{P_1}{P_2})}{\log(\frac{P_1}{P_3})} = \frac{\log(\frac{783.113}{773.055})}{\log(\frac{783.113}{774.338})} = 1.147$$

(2) 理論計算

(1) 不考慮振動

$$\bar{C}_v = \bar{C}_{v,trans} + \bar{C}_{v,rot} = \frac{3}{2}R + R = \frac{5}{2}R$$

$$\bar{C}_p = \bar{C}_v + R = \frac{5}{2}R + R = \frac{7}{2}R$$

$$\frac{\bar{C}_p}{\bar{C}_v} = \frac{\frac{7}{2}R}{\frac{5}{2}R} = 1.4$$

(2) 考慮振動(高溫條件時)

$$\bar{C}_v = \bar{C}_{v,trans} + \bar{C}_{v,rot} + \bar{C}_{v,vib} = \frac{3}{2}R + R + R = \frac{7}{2}R$$

$$\bar{C}_p = \bar{C}_v + R = \frac{7}{2}R + R = \frac{9}{2}R$$

$$\frac{\bar{C}_p}{\bar{C}_v} = \frac{\frac{9}{2}R}{\frac{7}{2}R} = 1.28$$