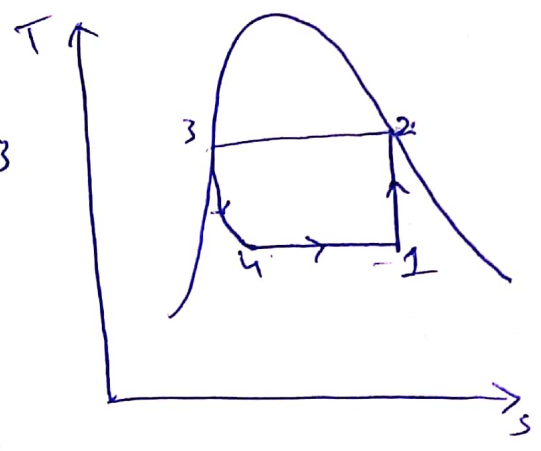
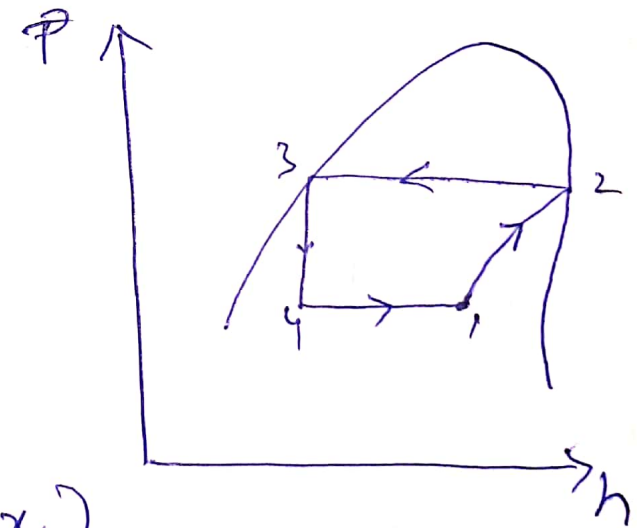


Temp (°C)	Latent heat kJ/kg	Latent heat	Latent entropy
25	$h_{f1} = 298.9$	$h_{f2} = 1166.94$	$s_{f2} = 1.1242$
-10	135.37	$h_{fg1} = 1297.68$	$s_{f1} = 0.5443$



$T_2 = T_3 = 25^\circ\text{C}$
 $T_1 = T_4 = -10^\circ\text{C}$

$h_{f3} = h_4 = 298.9 \text{ kJ/kg}$
 $h_{fg2} = 1166.94 \text{ kJ/kg}$



at state 1

entropy 1 = $s_1 = s_{f1} + \frac{x_1 h_{fg1}}{T_1}$

$s_1 = 0.5443 + 4.934 x_1$

$s_2 = s_{f2} + \frac{x_2 h_{fg2}}{T_2}$ $x_2 = 1$

$s_2 = 5.04$

$s_2 = s_1 = 0.5443 + 4.934 x_1$
 $x_1 = 0.91$

Similarly

$h_1 = h_{f1} + x_1 h_{fg1}$
 $= 1316.26 \text{ kJ/kg}$

at 2

$$h_2 = h_{f2} + x_2 h_{fg2} \quad x_2 = 1$$
$$= 1465.84 \text{ kJ/kg}$$

$$\text{COP} = \frac{N}{W}$$

$$= \frac{h_4 - h_1}{h_2 - h_1}$$

Since $h_4 = h_3$ from P-h chart

$$\text{COP} = \frac{h_{f3} - h_1}{h_2 - h_1}$$

$$\boxed{\text{COP} = 6.8}$$