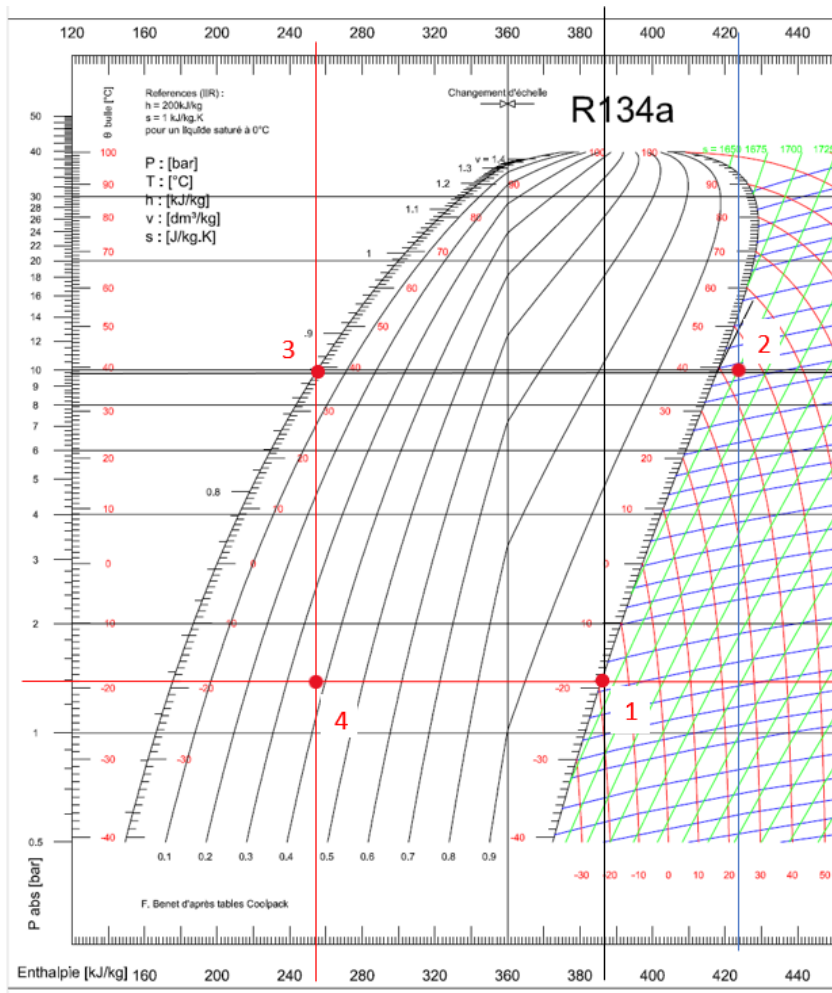




Lecture seventeen

e.g. A refrigeration cycle uses refrigerant R-134a and operates between a low-side pressure of 0.14MPa and high side pressure of 1MPa. The refrigerant mass flow rate is 0.05kg/sec. find the cooling effect, work input and cop of this machine.

Solution:





From P-h diagram and table we find the enthalpies of each point as follows:

Point	P MPa	h kJ/sec
1 (table)	0.14	387
2 (chart)	1	424
3 (table)	1	256
4	0.14	256

Work unput to compressor $W_c = h_2 - h_1 = 424 - 387 = 37$ kJ/kg.

Power input to the compressor = $m (h_2 - h_1) = 0.05 (424 - 387) = 1.85$ kW.

Refrigeration effect (Q_{evap}) = $h_1 - h_4 = 387 - 256 = 131$ kJ/kg.

Refrigeration effect in kW = $m (h_1 - h_4) = 0.05 (387 - 256) = 6.55$ kW.

$$COP = \frac{Q_{evap}}{W_{comp}} = \frac{131}{37} = 3.54$$

