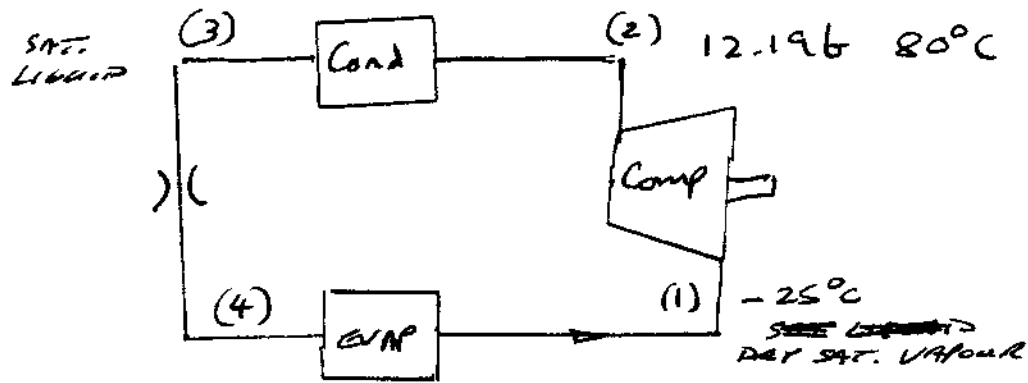


Q4 2002



$$P_1 = P_3 @ -25^\circ\text{C} = 1.23765$$

$$h_1 = h_g @ -25^\circ\text{C} = 176.48 \text{ kJ/kg}$$

$$h_2 @ 12.196 \text{ 80}^\circ\text{C} \quad t_s = 50^\circ\text{C} \text{ so } 30\text{K SUPERHEAT}$$

$$12.196 \text{ 30K s.h.} \quad h_2 = 230.33 \text{ kJ/kg}$$

$$h_3 = h_f @ 12.196 = 84.94 \text{ kJ/kg}$$

$$h_4 = h_3 \text{ (THROTTLE)}$$

$$\dot{Q}_{\text{out}} \text{ (CONDENSER)} = \Delta h = 230.33 - 84.94$$

$$\dot{Q}_{\text{out}} = 145.39 \text{ kJ/kg}$$

$$\dot{Q}_{\text{in}} \text{ (EVAPORATOR)} = \Delta h = 176.48 - 84.94$$

$$\dot{Q}_{\text{in}} = 91.54 \text{ kJ/kg}$$

$$\text{COMPRESSOR POWER} = \Delta h = 230.33 - 176.48$$

$$P_{\text{in}} = 53.85 \text{ kJ/kg}$$

$$C \text{ of } P \text{ (REFRIG)} = \frac{91.54}{53.85} = \underline{\underline{1.7}}$$

$$s_1 = 0.7127 \text{ kJ/kgK}$$

IDEALLY $s_2 = s_1$ AND CHECKING THIS MAKES THE VAPOUR SUPERHEATED AT (2)

CONSIDER THE IDEAL COMPRESSOR

$$s_1 = s_2 = 0.7127$$

FROM TABLES AT 12.12 bar 0.7127 PUTS
IT BETWEEN Sg AND 15 K

Sg	θ	15 K SUPER HEAT
0.6797	0.7127	0.7166

LINEAR INTERPOLATION

$$0.7127 - 0.6797 = 0.033$$

$$0.7166 - 0.6797 = 0.0369$$

$$\theta = \frac{0.033}{0.0369} \times 15 = 13.4 \text{ K FOR IDEAL COMPRESSION}$$

SIMILARLY TO FIND IDEAL ENTHALPY

h_g	13.4 K	15 K	$218.64 - 206.45 = 12.19$
206.45	h	218.64	

$$h - 206.45 = \frac{13.4}{15} \times 12.19 = 10.9 \quad h = 217.3 \text{ kJ/kg}$$

$$\text{IDEAL } h_2 = 217.3 \text{ kJ/kg}$$

$$\text{ACTUAL } h_2 = 230.33$$

$$\eta_{15} = \frac{217.3 - 176.48}{230.33 - 176.48} = \underline{\underline{0.76}}$$