{Question 4.75}

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P_3=5[bar]
x_3=0.20
P_4=5[bar]
T_4=20[C]

P_1=1[bar]
T_1=305[K]
AV_air=50[m^3/min]
P_2=0.95[bar]
T_2=295[K]

{Part A}
{Use first law equation to find mass flow rate of the refrigerant. We can neglect heat loss, work, kinetic energy, and potential energy}
 0=mdot_air*(h_1-h_2)+mdot_ref*(h_3-h_4)
mdot_air=AV_air*P_1*convert(bar,kPa)/(R#/molarmass(Air))/T_1
h_1=enthalpy(Air, T=converttemp(K,C,T_1))
h_2=enthalpy(Air, T=converttemp(K,C,T_2))
h_3=enthalpy(R134a, P=P_3*convert(bar,kPa), x=x_3)
h_4=enthalpy(R134a, T=T_4, P=P_4*convert(bar,kPa))
{Solving the The first law equation we find mdot_ref}
{Mass Flow Rate of Refrigerant: mdot_ref = 3.752 kg/min}

{Part B}
{Find heat transfer using first law of only the refrigerant. We can neglect work, kinetic energy, and potential energy}
 0=Qdot+mdot_ref*(h_3-h_4)
{Solving the The first law equation we find Qdot}
{Heat Transfer: Qdot = 573.8 kJ/min}
kJ=0
min=1
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SOLUTION

Unit Settings: SI C kPa kJ mass deg

AV_{air} = 50 [m^3/min]	h_1 = 305.5 [kJ/kg]	h_2 = 295.4 [kJ/kg]
h_3 = 110.5 [kJ/kg]	h_4 = 263.5 [kJ/kg]	kJ = 0
$mdot_{air}$ = 57.11 [kg/min]	$mdot_{ref}$ = 3.752 [kg/min]	min = 1
P_1 = 1 [bar]	P_2 = 0.95 [bar]	P_3 = 5 [bar]
P_4 = 5 [bar]	Qdot = 573.8 [kJ/min]	T_1 = 305 [K]
T_2 = 295 [K]	T_4 = 20 [C]	x_3 = 0.2

No unit problems were detected.

EES suggested units (shown in purple) for h_1 h_2 h_3 h_4 .