



MCG2130 - THERMODYNAMICS I

Midterm Examination
24 October 2014

Version c
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PROPERTIES DATA

Universal gas constant: $\bar{R} = 8.314 \text{ kJ/kmol K}$. Specific gas constant for air: $R = 0.287 \text{ kJ/kg K}$.

Specific Heats for Air as a Function of Temperature

T - K	c_{p0} - kJ/kg K	c_{v0} - kJ/kg K	$k = c_p/c_v$
300	1.007	0.720	1.40
400	1.011	0.724	1.40
500	1.029	0.742	1.39
600	1.053	0.766	1.37
700	1.078	0.791	1.36
800	1.101	0.814	1.35
900	1.122	0.835	1.34
1000	1.141	0.854	1.34

Saturation Table for R410a

Temperature C	Saturation Pressure kPa	Specific Volume m ³ /kg			Internal Energy kJ/kg		
		v_f	v_{fg}	v_g	u_f	u_{fg}	u_g
-30	269.6	0.000781	0.09392	0.09470	13.78	228.23	242.01
-20	399.6	0.000803	0.06400	0.06480	27.92	218.07	245.99
-10	573.1	0.000827	0.04470	0.04553	42.32	207.36	249.69
0	798.7	0.000855	0.03182	0.03267	57.07	195.95	253.02
10	1085.7	0.000886	0.02295	0.02383	72.24	183.66	255.90
20	1444.2	0.000923	0.01666	0.01758	87.94	170.21	258.16
30	1885.1	0.000968	0.01208	0.01305	104.32	155.24	259.56
40	2420.7	0.001025	0.00865	0.00967	121.61	138.11	259.72

Superheat Table for R410a

Temp	200kPa (-37.01°C)		Temp	300kPa (-27.37°C)		Temp	400kPa (-19.98°C)		Temp	600kPa (-8.67°C)	
C	v (m ³ /kg)	u (kJ/kg)	C	v (m ³ /kg)	u (kJ/kg)	C	v (m ³ /kg)	u (kJ/kg)	C	v (m ³ /kg)	u (kJ/kg)
Sat	0.12591	239.09	Sat	0.08548	243.08						
-20	0.13771	251.18	-20	0.08916	248.71	Sat	0.06475	246.00	Sat	0.04351	250.15
0	0.15070	265.06	0	0.09845	263.33	0	0.07227	261.51	0	0.04595	257.54
20	0.16322	279.13	20	0.10720	277.81	20	0.07916	276.44	-20	0.05106	273.56
40	0.17545	293.59	40	0.11564	292.53	40	0.08571	291.44	40	0.05576	289.19