Part B

	z	Tc, °K	Pc, Mpa	w	yi
nC6	0,33	507,4	3,012	0,305	0,615
nC7	0,33	540,3	2,736	0,349	0,264
nC8	0,34	568,8	2,486	0,396	0,121
					1,000

sum xK	0,9999997	
nC6	1,8635616	
nC7	0,7993923	
nC8	0,3565438	
Temp °K	363	Solve for sum xK = 1 by varying TK
P Mpa	0,1	

Equations

$$K_i = \frac{P_i^{sat}}{P} \approx \frac{P_{c,i}\,10^{\frac{7}{3}(1+\omega)\left(1-\frac{1}{T_{r,i}}\right)}}{P}$$

Shortcut K-ratio

$$\sum_i y_i = \sum_i K_i x_i = 1$$

T(°C)

90,2

Part B

	z	Tc, °K	Pc, Mpa	w	xi
nC6	0,33	507,4	3,012	0,305	0,1213732
nC7	0,33	540,3	2,736	0,349	0,272383
nC8	0,34	568,8	2,486	0,396	0,6062389

sum y/K	0,9999951	
nC6	2,7188867	
nC7	1,2115294	
nC8	0,560835	
Temp °K	378	Solve for sum y/K = 1 by varying TK
P Mpa	0,1	

Equations

$$K_i = \frac{P_i^{sat}}{P} \approx \frac{P_{c,i}\,10^{\frac{7}{3}(1+\omega)\left(1-\frac{1}{T_{r,i}}\right)}}{P}$$

Shortcut K-ratio

$$\sum_i x_i = \sum_i (y_i / K_i) = 1$$

T(°C)

105

Heat Capacity Constants		TK Cp in J/mol-K			nC6
	A	B	C	D	nC7
methanol ig	21,15	7,09E-02	2,59E-05	-2,85E-08	nC8
ethanol ig	9,014	2,14E-01	-8,39E-05	1,37E-09	
methanl Liq	111,7	-0,4264	1,09E-03		
ethanol Liq	281,6	-1,435	2,90E-03		

Heat of Vaporization at 760 mmHg			
	TbC	DHvap kJ/mc	Tb at 50°C
Methanol	64,7	38,278	
Ethanol	78,5	38,58	

Q Calculation Q = HL+HV-Hfeed Hfeed=0 L at 50°C and 0.2 Mpa (1520 mmHg)

	Methanol	Ethanol	Total		Ti (°C)	
HL	378,45926	966,82367	1345,2829			50
HV with L/F	549,5117	1228,6966	1778,2083		Ti (°K)	
HV with V/F	183,14994	-111,49939	71,650554			323
Change Hv	15932,276	12991,951	28924,227			
		Total Q =	20348,039	J/molF		
			20,348039	kJ/molF		

If not given DHvap at Initial Temp

	Methanol	Ethanol	Total		
Change Hv (J/mol)	#¡NUM!	#¡NUM!	#¡NUM!		Tr (°K)

z	Tc, °K	Pc, Mpa	w	xi	yi
0,33	507,4	3,012	0,305	0,173	0,416
0,33	540,3	2,736	0,349	0,318	0,337
0,34	568,8	2,486	0,396	0,509	0,247
				1,000	1,000

sum D	-2,24E-07
nC6	2,41
nC7	1,06
nC8	0,48
Temp °K	373
P Mpa	0,1
V/F	0,646
L/F	0,354

T °C: 100

Solve for sum D = 0 by varying V/F

Equations

Tb (°C) M	Tb (°C) E	Tf (°C)
64,7	78,5	74
Tb (°K) M	Tb (°K) E	Tf (°K)
337,7	351,5	347

$$\sum_i \frac{z_i(1-K_i)}{1_i+(V/F)(K_i-1)} = 0$$

$$\sum_i x_i - \sum_i y_i = \sum_i D_i = \sum_i \frac{z_i(1-K_i)}{1+(V/F)(K_i-1)}$$

$$0 = \left(\sum_i z_i H_i^F + \Delta H_{mix}^F\right) - \left(1-\frac{V}{F}\right)\left(\sum_i x_i H_i^L + \Delta H_{mix}^L\right) - \frac{V}{F}\left(\sum$$

Methanol	Ethanol
107,23772	118,05556

Tr > 0,5 For test to be valid

If not given DHvap at Initial Temp

$$\frac{\Delta H^{vap}}{RT_c} \approx 7(1-T_r)^{0.354} + 11\omega(1-T_r)^{0.456}$$

$$= 0$$

$$\sum_i y_i H_i^V + \Delta H_{mix}^V \Big) + \frac{\dot{Q}}{F}$$

Part a

Antoine Equation

log10(Psat[mmHg])=A-B/(T[oC]+C)

Compound	A	B	C	Tmin (°C)	Tmax (°C)	T (°K)
n-Octane	4	1355	-63,63			373

K (Antoine) 0,467

FUGACITY PREOS

F= 1 at T (°K) 373

Psat (Mpa) 0,0470

K (Preos) 0,470

Using Fugacity Ratio

T (°K) 373

P (Mpa) 0,1

f (L) 0,0460

f (V) 0,0946

K (Ratio) 0,487

Short-cut Method

w 0,396

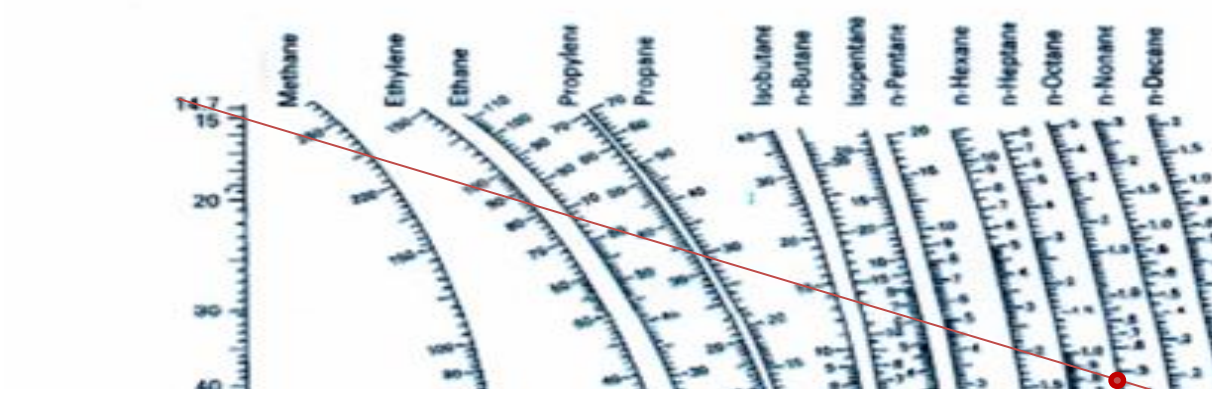
T(°K) 373 Tc (°K) 569

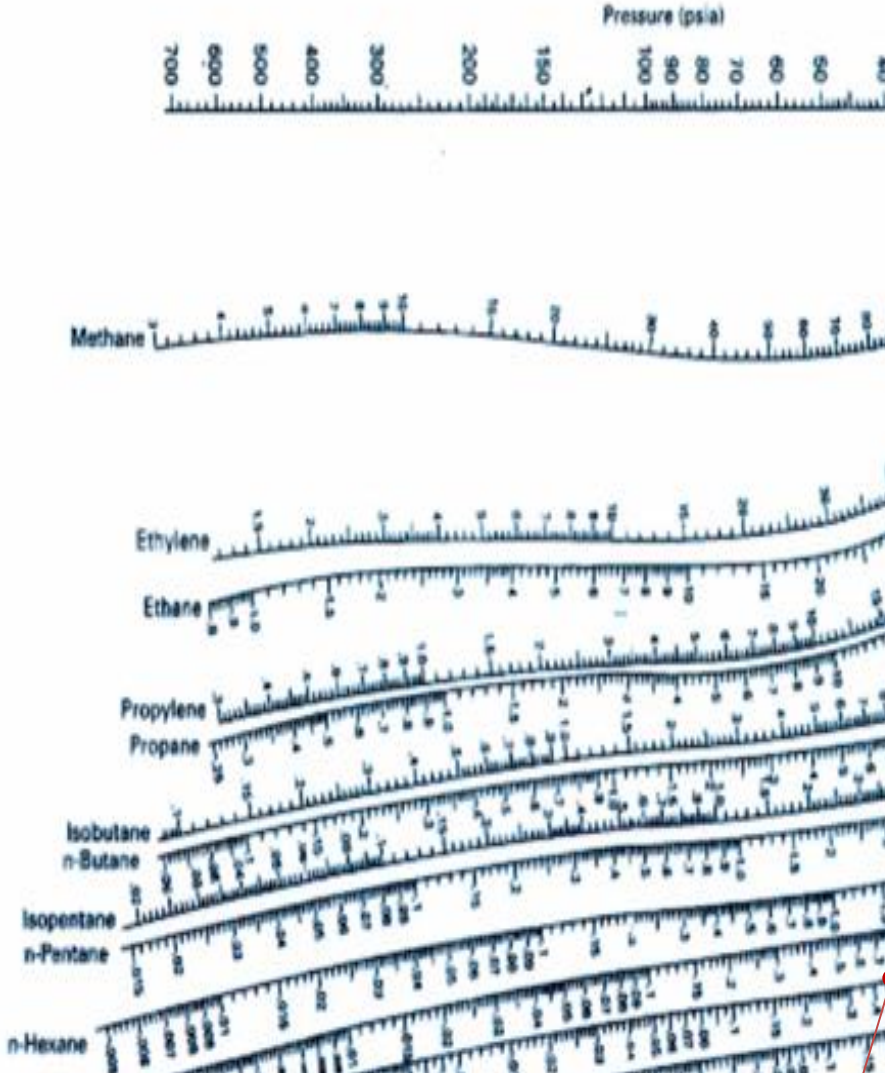
P (Mpa) 0,1 Pc (Mpa) 2,49

K (Short-cut) 0,485

De Priester

K 0,0765




Pressure (psia)
700
600
500
400
300
200
150
100
90
80
70
60
50
Methane
Ethylene
Ethane
Propylene
Propane
Isobutane
n-Butane
Isopentane
n-Pentane
n-Hexane

Psat (Bar)	Psat (MPa)
0,466800416	0,046680042

General K equation
K= Psat /P

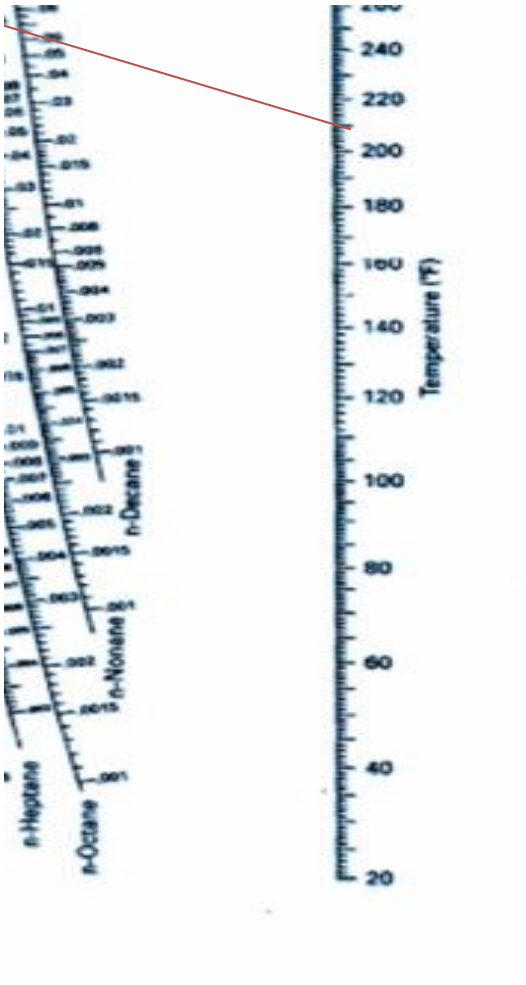
General K equation
K= Psat /P

General K equation
K= f(L)/f(V)

General K equation

$$K_i = \frac{P_i^{sat}}{P} \approx \frac{P_{c,i}\,10^{\frac{7}{3}(1+\omega)\left(1-\frac{1}{T_{r,i}}\right)}}{P}$$

Shortcut K-ratio


240
220
200
180
160
140
120
100
80
60
40
20
Temperature (F)
n-Decane
n-Nonane
n-Octane
n-Heptane