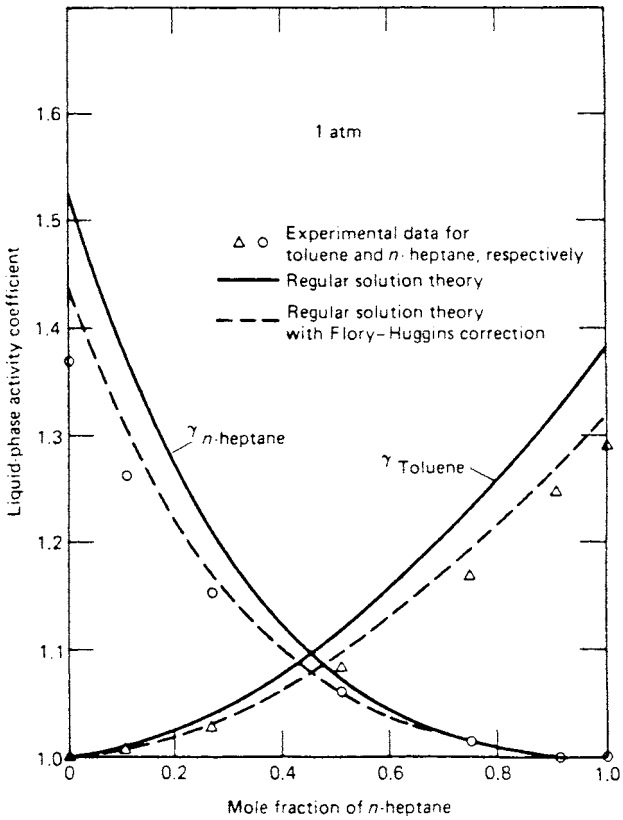

FIG. 13-14 Liquid-phase activity coefficients for an *n*-heptane–toluene system at 101.3 kPa (1 atm). [*Henley and Seader,* Equilibrium-Stage Separation Operations in Chemical Engineering, *Wiley, New York, 1981; data of Yerazunis et al.,* AIChE J., ***10,*** *660 (1964).*]

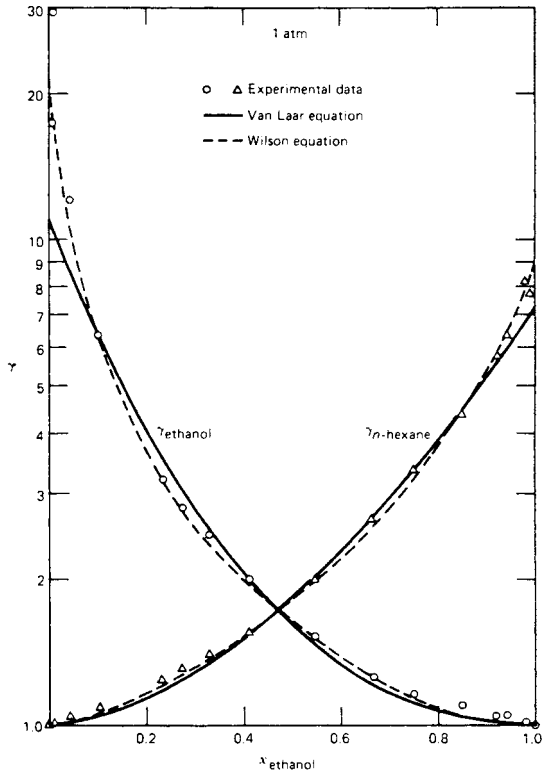

FIG. 13-15 Liquid-phase activity coefficients for an ethanol–*n*-hexane system. [*Henley and Seader,* Equilibrium-Stage Separation Operations in Chemical Engineering, *Wiley, New York, 1981; data of Sinor and Weber,* J. Chem. Eng. Data, **5,** *243–247 (1960).*]

TABLE 13-4 Antoine Vapor-Pressure Constants and Liquid Molar Volume*

Species	Antoine constants† A	B	C	Applicable temperature region, °C	v^L, liquid molar volume, cm³/g·mol
Acetic acid	8.02100	1936.010	258.451	18–118	57.54
Acetone	7.11714	1210.595	229.664	(–13)–55	74.05
Benzene	6.87987	1196.760	219.161	8–80	89.41
1-Butanol	7.36366	1305.198	173.427	89–126	91.97
Carbon tetrachloride	6.84083	1177.910	220.576	(–20)–77	97.09
Chloroform	6.95465	1170.966	226.232	(–10)–60	80.67
Ethanol	7.58670	1281.590	193.768	78–203	58.68
Ethanol	8.11220	1592.864	226.184	20–93	58.68
Ethyl acetate	7.10179	1244.951	217.881	16–76	98.49
Formic acid	6.94459	1295.260	218.000	36–108	37.91
n-Hexane	6.91058	1189.640	226.280	(–30)–170	131.61
Methanol	8.08097	1582.271	239.726	15–84	40.73
Methyl acetate	7.06524	1157.630	219.726	2–56	79.84
1-Propanol	8.37895	1788.020	227.438	(–15)–98	75.14
2-Propanol	8.87829	2010.320	252.636	(–26)–83	76.92
Tetrahydrofuran	6.99515	1202.290	226.254	23–100	81.55
Water	8.07131	1730.630	233.426	1–100	18.07

*Abstracted from Gmehling and Onken, *Vapor-Liquid Equilibrium Data Collection,* DECHEMA Chemistry Data ser., vol. 1 (parts 1–10), Frankfurt, 1977.
†Antoine equation is $\log P^{sat} = A - B/(T + C)$ with P^{sat} in torr and T in °C.
NOTE: To convert degrees Celsius to degrees Fahrenheit, °F = 1.8°C + 32. To convert cubic centimeters per gram-mole to cubic feet per pound-mole, multiply by 0.016.