MISCIBILITY GAPS IN METHYL NONADECANOATE + DICARBOXYLIC ACID BINARY SYSTEMS

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The liquid-liquid and liquid-solid equilibria of the binary systems composed of methyl nonadecanoate and some aliphatic acids or stearic alcohol or diphenyl are presented; the enthalpy of fusion of the ester is given, and a discussion is carried out on the factors affecting the liquid-liquid equilibria studied to date.

Recently, we took interest in a possible graphical method of studying several binary systems exhibiting the demixing phenomenon, composed of one substance with a polar group and another substance with two polar groups.

In this note we give the liquid-liquid and liquid-solid equilibrium curves for the binary systems methyl nonadecanoate (component 1) + dicarboxylic acids, lauric and stearic acids, diphenyl, or stearic alcohol (components 2) and carry out a discussion in terms of the parameters $a$ and $b$ of the equation

$$\ln \left( \frac{x_i}{x'_i} \right) = a - b(T - T_m)$$

previously proposed [1] for liquid-liquid equilibrium curves.

Experimental

The temperature of first crystallization or of demixing was measured visually by means of a Chromel Alumel thermocouple (checked with a Pt resistance thermometer) connected to a Leeds Northrup K-5 potentiometer. The fusion enthalpy is measured with a DSC-1B Perkin-Elmer calorimeter. The details of calibration are given in previous papers [2, 3]. When it was necessary to work below room temperature the cryostat was connected to a Lauda refrigerator.

The chemicals are: Fluka methyl nonadecanoate, glutaric, adipic, azelaic and lauric acids and stearic alcohol; Merck pimelic, succinic and suberic acids; Erba diphenyl. Methyl nonadecanoate (purity 98%) was employed without further purification; the other compounds were recrystallized from $\text{C}_2\text{H}_5\text{OH}$ and dried under dynamic vacuum, at a temperature some degrees below the melting point.
Results and discussion

The thermodynamic fusion data are given in Table 1. The trend of the equilibrium curves is shown in Fig. 1, and in Table 2 the coordinates of the invariant points are given. As in the case of ethyl stearate, four gaps are found (also with pimelic acid). This fact was expected because ethyl stearate and methyl nonadecanoate are isomers and have identical polar characters.

Fig. 1. Phase equilibrium curves concerning binary systems methyl nonadecanoate + a) from the top: suberic acid, succinic acid. b) from the top: laurie acid, pimelic acid. c) from the top: diphenyl, azelaic acid, glutaric acid. d) from the top: 1-octadecanol, stearic acid, adipic acid