Viscosity for Some Organic Binary Liquid Systems: A Theoretical Study on Correlative Modeling

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Abstract

This study investigates the performance of different groups of binary liquid mixtures for various aliphatic hydrocarbons of both polar and non-polar types. This highlights the importance of selecting appropriate models based on the specific composition of the mixture for accurate predictions in industrial processes and product optimization. For this purpose, well-known equations of Grunberg-Nissan, Hind, Heric, Ausländer, McAllister 3- body and McAllister 4- body are utilized and tested for the viscosity data of different binary liquid systems, collected from previous research. The systems consist of various aliphatic alkanes, cycloalkanes, and alkanols. They are classified into four groups: Group A (Aliphatic Alkane + Alkane), Group B (Aliphatic Alkane + Cycloalkane), Group C (Aliphatic Alkane + Alkanol) and Group D (Aliphatic Cycloalkane + Alkanol). In order to measure the fitting capabilities for every group of systems, Standard Percentage Deviations (SPD) as well as temperature Average Standard Percentage Deviations (ASPD) for all of the systems are estimated. For both dynamic and kinematic viscosity correlations, among four categories, the best results are found for Group A (Aliphatic Alkanes + Aliphatic Alkanes), followed by Group B (Aliphatic Alkanes + Cycloalkanes), with the poorest results for Group C (Aliphatic Alkanes + Alkanols). In addition, with the increment of the chain length of the systems, a linear change in deviation is also observed.

Keywords: *Aliphatic hydrocarbons, Viscosity, Binary systems and Correlative models.*

1. Introduction

Numerous mixing laws have been proposed to calculate the viscosity of mixtures, which can account for the deviations from an ideal behaviour [1–7]. The laws used for calculating viscosities of liquid mixtures are mainly classified as predictive [8-9] and correlative [10–17]. The predictive approach requires only pure components data and functional group parameters to calculate the mixture viscosity, while correlative models involve interaction parameters obtained through optimization techniques [7], [18-19]. The use of correlative models to determine the dynamic and kinematic viscosities of liquid mixtures has gained significant attention in recent years [10], [20-21]. Despite various attempts made in the 20th century, a reliable model on theoretical grounds for predicting the viscosities of liquid mixtures has not been established.

From another perspective, it is essential to determine which types of binary mixtures are best suited to specific models, as molecular structures can vary significantly. Additionally, each model has

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Manuscript History:
Received 16 January, 2024, Revised 16 October, 2024, Accepted 17 October, 2024, Published 31 October, 2024

https://doi.org/10.33736/jaspe.6493.2024

e-ISSN: 2289-7771

distinct equations and adjustable parameters that need to be considered. The molecules can be polar, non-polar, and cyclic in nature. Again, when the liquid molecules are combined, their behavior changes as a result of the mixing process. The interactions and transformations that occur when liquid molecules combine can also influence these considerations. Therefore, the study of the viscosity of liquid molecules and their mixtures is important from practical and theoretical points of view, as each study can provide new information about their multifarious characteristics [22–27].

In this study, well-known viscosity models, including four for dynamic viscosity [28–31] and two correlative models for kinematic viscosity [32], were tested using huge experimental data of different categories of organic binary liquid systems. The results were compared numerically and graphically to assess the correlating capability of different categories of binary liquid systems with these famous viscosity models. The findings suggest that correlative models generally led to better results, but optimization techniques were necessary to determine the interaction parameters. However, the viscosity data of 89 organic binary systems, categorized into Group A (Aliphatic Alkanes + Alkanes), Group B (Aliphatic Alkane + Cycloalkane), Group C (Aliphatic Alkane + Alkanol), and Group D (Aliphatic Cycloalkane + Alkanol), were obtained from reputable publications, covering the entire composition range at constant pressure and different temperatures. The viscosities of all binary liquid mixtures were correlated with these standard models: Grunberg-Nissan [28], Hind [29], Heric [30] and Ausländer [31] for dynamic viscosity, and McAllister-3 body and McAllister-4 body [32] for kinematic viscosity.

Based on our understanding, previous research has primarily focused on identifying the most suitable models for correlating the viscosity of mixtures. However, there remains a gap in exploring which categories of systems are compatible with specific models. The main objective of this investigation was to assess how well four distinct types of binary liquid systems correspond with these established viscosity models. This involved utilizing experimental viscosity data to compute interaction parameters across these correlation models, determining Standard Percentage Deviations (SPD), (σ%) and conducting an in-depth analysis to identify the most compatible group of binary liquid systems across all models. This study is expected to contribute to the understanding of liquid theory and provide insight into the characteristics of liquid mixtures. Moreover, developing a reliable theoretical model for predicting the viscosities of liquid mixtures could provide valuable practical benefits in various fields, such as chemical engineering, materials science, and pharmaceuticals [33–35].

2. Correlative Models

In this present specific mixing laws were applied to determine the dynamic and kinematic viscosities. This helped to evaluate deviations from an ideal blend in binary liquid systems. These laws are based on various adjustable parameters or interactions utilized in correlative models, which help calculate the viscosity properties of the flowing substances.

One parameter-based Grunberg-Nissan (GN) model equation:

$$Log\eta_s=N_1 log\eta_1+N_2 log\eta_2+N_1N_2G_{12} \quad (1)$$

Where, G_{12} is an interaction parameter.

One parameter based on Hind (HI) model equation:

$$\eta_{mix}=x^2\eta_{11}+2x(1-x)\eta_{12}+(1-x)^2\eta_{22} \quad (2)$$

Where, η_{12} is an interaction parameter.

Two parameters based on the Heric (HE) model equation:

$$Ln\eta=x_1 ln\eta_1+x_2 ln\eta_2+x_1 lnM_1+x_2 lnM_2-ln[x_1M_1+x_2M_2]+x_1x_2\{H_{12}+H_{21}(x_1-x_2)\} \quad (3)$$

Where, H_{12} and H_{21} are the requisite adjustable parameters.

Three parameters based on Ausländer (AU) model equation:

$$\eta=\{x_1\eta_1(x_1+B_{12}x_2)+x_2\eta_2A_{21}(B_{21}x_1+x_2)\}/\{x_1(x_1+B_{12}x_2)+x_2A_{21}(B_{21}x_1+x_2)\} \quad (4)$$

Where B_{12}, B_{21} and A_{21} are the adjustable parameters.

Two parameters based on the McAllister 3-body (Mac3) model equation:

$$ln\eta = x_1^3 ln\eta_1 + 3x_1^2 x_2 lnZ_{12} + 3x_1 x_2^2 lnZ_{21} + x_2^3 ln\eta_2 - ln[x_1 + x_2(M_2/M_1)] + 3x_1^2 x_2 ln[(2 + M_2/M_1)/3] + 3x_1 x_2^2 ln[(1 + 2M_2/M_1)/3] + x_2^3 ln(M_2/M_1) \quad (5)$$

And three parameters based on the McAllister 4-body (Mac4) model equation:

$$ln\eta = x_1^4 ln\eta_1 + 4x_1^3 x_2 lnZ_{1112} + 6x_1^2 x_2^2 lnZ_{1122} + 4x_1 x_2^3 lnZ_{2221} + x_2^4 ln\eta_2 ln[x_1 + x_2(M_2/M_1)] + 4x_1^3 x_2 ln[(3 + M_2/M_1)/4] + 6x_1^2 x_2^2 ln[(1 + M_2/M_1)/2] + 4x_1 x_2^3 ln[(1 + 3M_2/M_1)/4] + x_2^4 ln(M_2/M_1) \quad (6)$$

Here Z_{12}, Z_{21}, Z_{1112}, Z_{1122} and Z_{2221} represent the interaction parameters and M_i is the molar mass of pure component i.

3. Data processing techniques

A specialized Microsoft Excel spreadsheet, integrated with the 'Solver' add-in, was created specifically to compute various selected binary systems. Equations (1) through (6) were utilized in this spreadsheet, employing different correlative models. By configuring the 'Solver' tool within the spreadsheet, we obtained all the coefficients or interaction parameters needed for these models prior to employing the Nonlinear Least Squares Minimization (NLSM) technique [36–38]. We then compared these computed coefficients with literature values available for similar binary systems, previously investigated using comparable optimization methods when applying any of these correlative models [11], [39–43].

After that, to find out the accuracy of these models, the experimental viscosity data at different temperatures were fitted to the models and the correlating abilities of each of these models were expressed in terms of Standard Percentage Deviations (SPD), σ (%), that was calculated by following the equation:

$$\sigma(\%) = \left[\left(\frac{1}{n-p} \right) \sum \left(100 \times \frac{\eta_{exp} - \eta_{cal}}{\eta_{exp}} \right)^2 \right]^{1/2} \quad (7)$$

Where, η_{cal} and η_{exp} refer to calculated and experimental η, n represents the number of data points and p is the number of coefficients considered and a similar type of equation was employed in calculating SPD, σ (%) for the respective kinematic viscosities, ν.

4. Results

The relation between dynamic viscosity, η and kinematic viscosity, ν is given by ν = η/ρ. To calculate the respective model parameters, non-linear regression analysis methods were employed. For correlating dynamic viscosities, η, the collected experimental data for each of the stated systems were then fitted to the one parameter-based Grunberg and Nissan (GN) and Hind (HI) models, two parameter-based Heric (HE), as well as the three parameter-based Ausländer (AU) equations. Whereas, for correlating their kinematic viscosities, ν, the two-parameter McAllister 3-body (MC3) and three-parameter McAllister 4-body (MC4) equations were utilized.

However, to better understand the results, the calculated σ (%) values for all of the 89 systems under present investigation were group-wise tabulated and discussed. All of the coefficients or correlating parameters of the model equations along with their SPD, σ(%) values within respective temperature ranges are provided in the supporting information (Tables 1-8). Their temperature-dependent averages, as average standard percentage deviations (ASPD), as well as overall averages

(OASPD) for each group are shown for the systems under different categories. These are given in the supporting information, Tables 9 - 12. Figures 1 presents the ASPD for all of the separate groups against different correlative models. Finaly, in Figure 5, the OASPD for the individual groups are displayed using a bar graph.

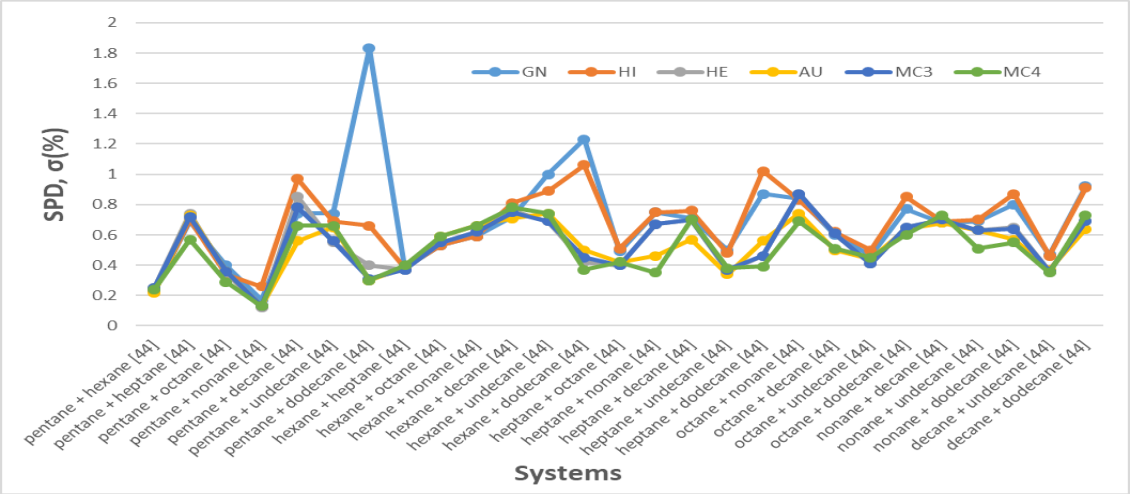

Figure 1. Representation of the SPD, σ(%) values for the whole Group A: Aliphatic Alkane + Alkane.

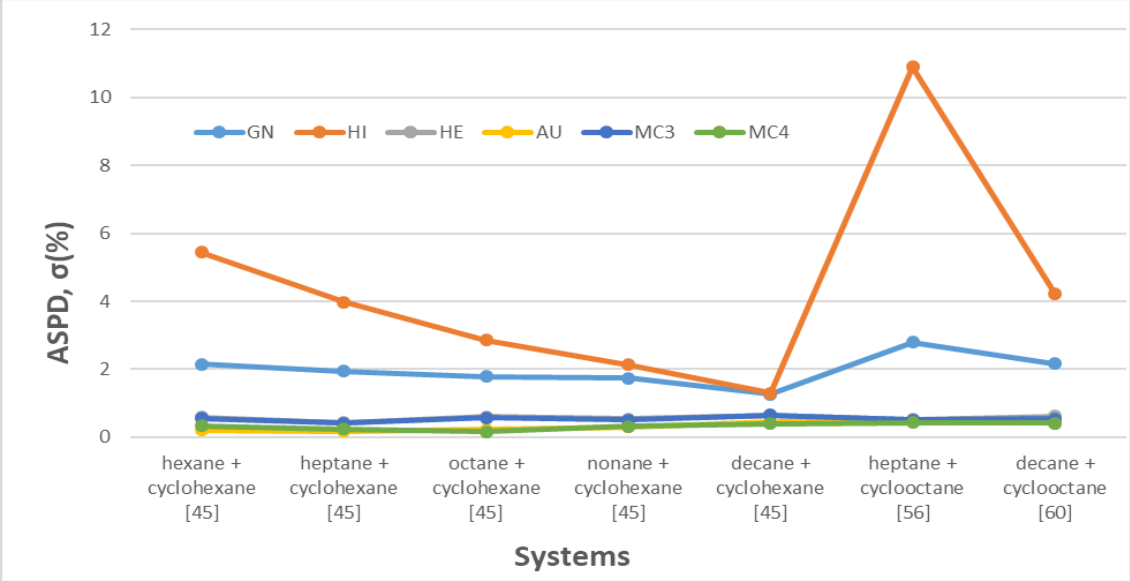

Figure 2. Representation of the ASPD, σ(%) values for the whole Group B: Aliphatic Alkane + Cyclolkane.

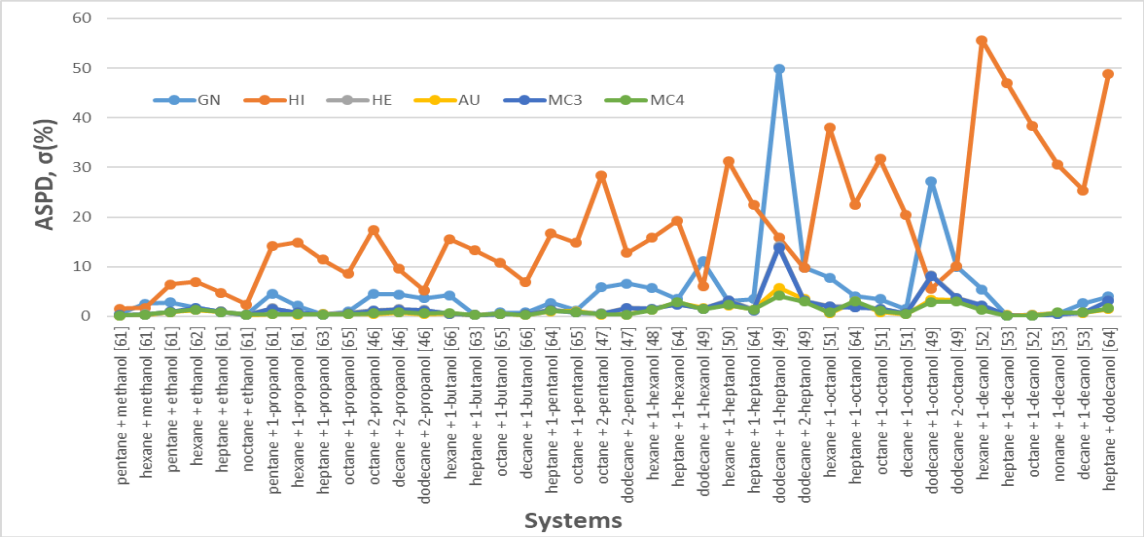

Figure 3. Representation of the ASPD, σ(%) values for the whole Group C: Aliphatic Alkane + Alkanol.

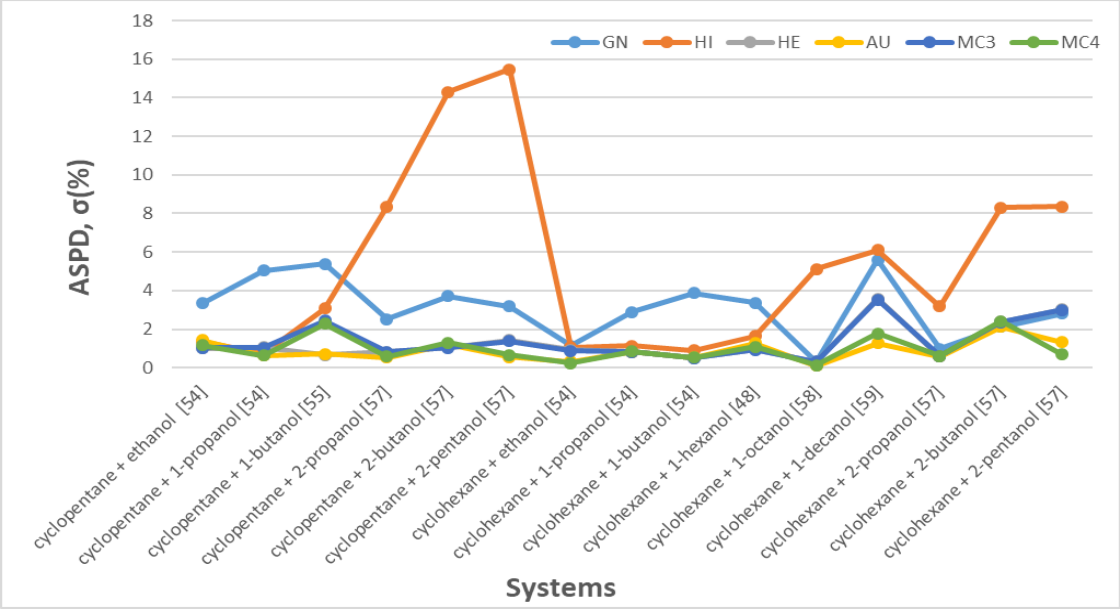

Figure 4. Representation of the ASPD, σ(%) values for the whole Group D: Aliphatic Cycloalkane + Alkanol.

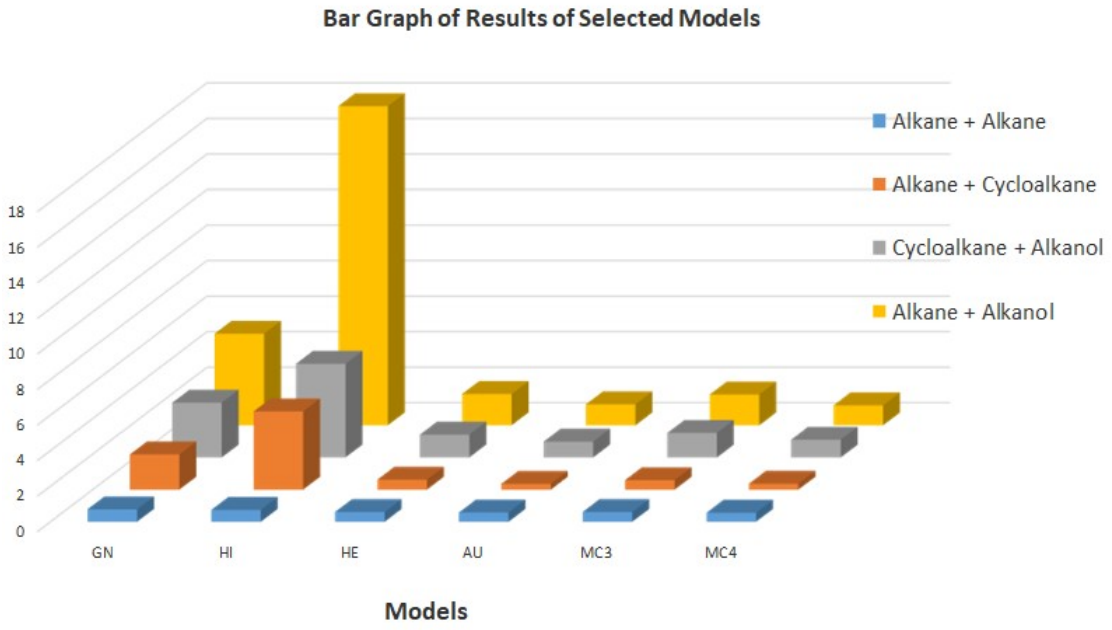

Figure 5. Graphical representation of the OASPD, σ(%) values for all the four Groups.

5. Discussion

In this current study, four different classes of binary liquid systems were applied to various well-known viscosity models - four for dynamic viscosity and two for kinematic viscosity - to explore their correlating capabilities. Experimental viscosity data from 89 binary liquid systems, consisting of 28 different aliphatic hydrocarbons, were sourced from the literature [44–66] and used for analysis. The selected models for dynamic viscosity were Grunberg-Nissan (GN), Hind (HI), Heric (HE), and Ausländer (AU), while the McAllister 3-body (MC3) and McAllister 4-body (MC4) models were used for kinematic viscosity. For systematic investigation, all of the binary liquid systems consisting of different aliphatic hydrocarbons, a few alicyclic hydrocarbons and some normal and isomeric alkanols, were categorized into four different groups.

In Group A: Aliphatic Alkane + Alkane, for dealing with their dynamic and kinematic viscosity data, there were altogether 27 binary liquid systems consisting of 10 different aliphatic hydrocarbons. Table 1 and Table 2 show the computed fitting parameters for the concerned models along with the detailed results of Standard Percentage Deviations (SPD). For both dynamic and kinematic viscosities, the deviation patterns, as well as fittings of the correlative models appear to be quite satisfactory. As the results of SPD in Table 9 and Figure 1 depict, for most of the systems, the deviations are small and less than 1% except for pentane + dodecane, hexane + dodecane and heptane + dodecane systems for the models of Grunberg-Nissan and Hind. Again, it was seen that with the increment of chain length, the deviations increased. For example, if we consider the systems of pentane + alkanes, the lowest values were found for pentane + hexane, and the highest values for pentane + dodecane. In the same way, when we examined the systems of hexane + alkanes, heptane + alkanes, octane + alkanes, nonane + alkanes and decane + alkanes, a similar trend was also observed. On the other hand, for a particular system, when we went through from left to right, it became evident that with increasing interaction parameters of these models, the deviations generally decreased. Pursuing the results of whole Group A, the systems of pentane + hexane, pentane + octane, pentane + nonane, hexane + heptane, heptane + octane and decane + undecane were found to exhibit small deviations as they were relatively small molecules and close in methyl group or carbon number. At the same time, large

deviations were found for these systems, which were alkanes + decane, alkanes + undecane and alkanes + dodecane, as they were comparatively larger in size and different in the alkyl chain. However, all the systems in this category showed a good fit with the six correlative models, but the best results were found for three parameters based on Ausländer as well as the McAllister 4-body model.

In Group B: Aliphatic Alkane + Cycloalkane, there were altogether 7 systems where 5 systems came from five aliphatic alkanes with cyclohexane, and the remaining 2 from 2 different aliphatic alkanes with cyclooctane. Their viscosity data were within the temperature ranges of 298.15 - 313.15 K. Table 3 and Table 4 show the fitting parameters for the concerned models along with the detailed results of SPD values. The experimental viscosities and those computed by employing various correlative models for all these systems are shown in Table 10 and Figure 2 the pattern of deviations as well as the extent of fittings of relevant models at different temperatures were good and the observed deviations were different for different systems as well as for different models. Comparing ASPD values for Grunberg-Nissan, Hind, Heric, Ausländer, McAllister 3-body and McAllister 4-body models as shown in Figure 2, the alkanes + cyclohexane systems gave larger deviations than the alkanes + cyclooctane systems. However, deviations for both types decreased linearly with increasing alkane chain length. For dynamic viscosities, the largest deviations were observed with the Hind and Grunberg-Nissan models. These deviations decreased when moving from the hexane + cyclohexane systems to decane + cyclohexane, or from heptane + cyclooctane to decane + cyclooctane systems. The highest deviation value was found for the heptane + cyclooctane system (2.8 and 10.9). The remaining models, such as Heric, Ausländer, McAllister 3-body, and McAllister 4-body, showed significantly smaller deviations (less than 1%), as they included more interaction parameters. Unlike Group A, an opposite trend was observed here, with deviations decreasing as the alkane chain length increased.

There were 40 systems in Group C: Aliphatic Alkane + Alkanol consisting of 6 different aliphatic alkanes with 14 different aliphatic alkanols. Their viscosity data were within the temperature range of 293.15 to 323.15 K. The detailed results of the fitting parameters, along with the Standard Percentage Deviations (SPD) computed using various correlative models for the systems studied, are presented in Table 5 and Table 6. These tables show the deviation patterns and how well the correlative models fit the different systems at different temperatures. As shown by the ASPD values for all systems in Group C (listed in Table 11) and Figure 3 for all models, a linear decrease in deviations was observed as the alkane chain length increased. This trend was evident for systems such as pentane + ethanol to octane + ethanol, pentane + 1-propanol to octane + 1-propanol, and for systems where the alkane changed from hexane to decane, like hexane + 1-butanol to decane + 1-butanol, hexane + 1-octanol to decane + 1-octanol, and hexane + 1-decanol to decane + 1-decanol.Thus, for a particular alkanol except methanol, deviations decreased as the chain length of the alkanes increased. This kind of pattern was also shown in Group B. Again, for all the systems in Figure 3, when we moved forward from left to right, it was shown that for all the models, the observed deviations were relatively large as the chain length of both molecules increased in the systems and the highest deviations were found for the systems of alkanes + heptanol, alkanes + octanol as well as alkanes + decanol. Systems of secondary alkanols with alkanes showed ASPD, σ (%) values very close to those of the primary alkanols with alkanes and also it was difficult to find the order of change with respect to increment in the chain length of the alkanes. However, for dynamic viscosities, maximum deviations were observed for the Hind model where the ASPD values were extremely high, lying from 1.56 to 55.60 as well as for the Grunberg-Nissan model. Significantly low ASPD values were found for the three parameters based on the Ausländer model and most of the systems had their values lying within the range of 0.21–5.79. On the other hand, for kinematic viscosities, both McAllister's four-body and McAllister's three-body models gave better results, as shown in Figure 3. Here, deviations showed a slightly increasing trend from alkane d+ methanol up to alkane + octanol, i.e., where the alkanol chain changed from methanol to octanol and then decreased for the rest.

In Group D: Aliphatic Cycloalkane + Alkanol, overall there were 15 different systems, where 6 systems consisted of cyclopentane with 6 different aliphatic alkanols and the remaining 8 systems were for the mixtures of 9 aliphatic alkanols with cyclohexane. Relevant viscosity data availed from different literatures were within the temperature ranges of 293.15 to 323.15 K. Tables 7 and 8 provide

the fitting parameters along with the detailed results of Standard Percentage Deviations (SPD) for all these systems, and those computed by employing different correlative models under consideration and show the pattern and extent of deviations. As Table 12 and Figure 4 compare the values of ASPD, it can be noted that the systems of cyclopentane + alkanols yielded smaller deviations than those of cyclohexane + alkanols systems. Furthermore, for both types of systems, the relevant deviations showed their tendency to increase for the first few systems, and then decrease as the chain length of the alkanols increases. Again, systems containing secondary alkanols showed deviations of lower magnitude than those of the systems of the respective primary alkanol. Also, the deviations tended to decrease as the chain length of the secondary alkanols shortened. Overall, for dynamic viscosities, here, the maximum deviations were also observed for the Hind model where values were exceptionally high for the systems of cyclopentane + 2-butanol (14.29) and cyclopentane + 2-pentanol (15.46) followed by Grunberg-Nissan model. Significantly low ASPD values were found for all the other four models laying below 4% and surprisingly, values of two parameters based on Heric and McAllister's three-body models resembled each other. Furthermore, three parameters based on Ausländer as well as McAllister's four-body models showed the least deviations for most of the systems with their ASPD values lying within the range of 0.10–2.41. Among all the models, Grunberg-Nissan for the systems containing primary alkanols and the Hind model for the systems containing the secondary alkanols ASPD values were observed to be quite large, whereas the corresponding ASPD values of AU, MC3, and MC4 models were small.

Finally, to assimilate the correlating capabilities of the four different categories of systems, the OASPD, σ(%) results for all of the models are graphically displayed in Figure 5. As indicated by their OASPD values, Group A (Alkane + Alkane) exhibited the smallest deviations for dynamic viscosities. Here, all models produced fairly good results, with values below 1%, and the deviations decreased as the number of interaction parameters increased. Again, the results were very poor for Group C, Alkane + Alkanol type, and the maximum OASPD values were found for Hind (17.96), followed by Grunberg-Nissan (5.15) models. For kinematic viscosities, correlating abilities of all the four categories seemed to be extremely good and the best results were found for Group B, Alkane + Cycloalkane as well as Group A. The values for both the MC3 and MC4 models were found to be less than 2%, with comparatively higher values observed for Group C, followed by Group D. Overall, it was observed that for both dynamic and kinematic viscosities calculations, the best results were found in Group A as well Group B. Again, as the chain length of the molecules or systems increases, the results generally change in a linear pattern, with most cases showing a decrease in deviations. Among all the viscosity models investigated in this study, the three-parameter McAllister-4 body model proved to be the best, with excellent correlating capabilities for all systems categories. In contrast, the one-parameter Hind model was the poorest, showing the most deviations, and hence, with the lowest correlating capabilities for all groups of systems.

6. Conclusion

In this study, various binary liquid systems, classified into four distinct groups, were evaluated using both dynamic and kinematic viscosity correlation models. The main purpose was to assess the effectiveness of these systems and models in predicting viscosities. Notably, binary systems categorized as Group A (Alkane + Alkane) and Group B (Alkane + Cycloalkane) demonstrated strong suitability and compatibility across all investigated dynamic and kinematic viscosity models. Conversely, Group C (Alkane + Alkanol) and Group D (Cycloalkane + Alkanol) systems yielded poorer results, with the Hind and Grunberg-Nissan models exhibiting maximum deviation, particularly in dynamic viscosity predictions. It was also observed that non-polar + non-polar systems showed smaller deviations and provided a better fit compared to non-polar + polar systems. Furthermore, it was observed that deviations tended to decrease as the chain length of alkanes, cycloalkanes, and alkanols increased across all system types. Additionally, secondary alkanols displayed deviations of lower magnitude compared to their respective primary alkanol counterparts. These findings emphasize the importance of considering molecular structure and composition when predicting viscosities in binary liquid systems. They also highlight the potential limitations of certain viscosity models in accurately capturing the behavior of specific system configurations. However, the Hind model showed

high deviations due to its purely additive nature, while the Grunberg-Nissan model had mixed results. The Heric model, incorporating molar mass and logarithmic additivity, performed better, as did Auslander's empirical model. However, the two and three-parameter-based MC3 & MC4 models outperformed others, with Auslander and McAllister's four-body models proving highly effective due to their comprehensive treatment of interactions in the mixtures.

Acknowledgements

The authors extend their gratitude for the generous financial assistance received from the Ministry of Science, Information and Communication Technology of the Government of the People's Republic of Bangladesh.

Conflict of interest

We declare no conflict regarding the publication of the study.

Supporting Information (Tables 1-12): Interaction parameters of different correlative models and their Standard Percentage Deviation (SPD), ASPD for different temperatures as well as overall averages, and OASPD for all four Groups of binary systems.

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Supporting Information

Table S1. Correlating parameters and standard percentage deviations (SPD), σ(%) of Grunberg-Nissan, Hind, Heric and Ausländer models for dynamic viscosities, η of the binary systems of Group A: Aliphatic Alkane + Alkane.

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
1	pentane + hexane	298.15	-0.008	0.24	0.254	0.23	0.008	-0.003	0.25	32.03	37.30	0.010	0.22
2	pentane + heptane	298.15	0.117	0.69	0.300	0.70	0.169	-0.014	0.74	0.078	0.051	11.59	0.73
3	pentane + octane	293.15	0.173	0.40	0.338	0.34	0.282	0.058	0.35	12.32	14.88	0.061	0.36
4	pentane + nonane	298.15	0.281	0.17	0.382	0.26	0.448	0.047	0.12	1.076	1.334	0.653	0.13
5	pentane + decane	298.15	0.470	0.74	0.444	0.97	0.694	0.029	0.85	0.052	0.025	13.35	0.56
6	pentane + undecane	298.15	0.561	0.74	0.483	0.69	0.873	0.153	0.55	1.560	2.139	0.350	0.65
7	pentane + dodecane	298.15	0.662	1.83	0.521	0.66	1.074	0.307	0.40	1.553	2.406	0.343	0.30
8	hexane + heptane	298.15	0.005	0.38	0.338	0.38	0.015	-0.018	0.37	0.016	-0.009	53.66	0.38
9	hexane + octane	298.15	0.036	0.53	0.383	0.53	0.075	-0.006	0.55	1.432	1.701	0.546	0.59
10	hexane + nonane	298.15	0.123	0.59	0.437	0.59	0.202	0.017	0.62	2.322	2.878	0.318	0.66
11	hexane + decane	298.15	0.263	0.72	0.501	0.81	0.337	-0.023	0.76	0.057	0.038	12.87	0.71
12	hexane + undecane	298.15	0.288	1.00	0.535	0.89	0.483	0.142	0.69	2.837	4.203	0.229	0.74
13	hexane + dodecane	298.15	0.380	1.23	0.580	1.06	0.644	0.213	0.42	14.59	23.38	0.032	0.50
14	heptane + octane	298.15	-0.015	0.49	0.436	0.51	-0.005	0.046	0.40	0.980	1.365	0.999	0.42
15	heptane + nonane	298.15	0.034	0.75	0.496	0.75	0.070	0.077	0.67	0.004	0.054	218.3	0.46
16	heptane + decane	298.15	0.148	0.71	0.570	0.76	0.203	-0.044	0.70	0.005	-0.025	141.8	0.57
17	heptane + undecane	298.15	0.173	0.50	0.618	0.48	0.279	0.068	0.36	35.44	49.36	0.015	0.34
18	heptane + dodecane	293.15	0.207	0.87	0.659	1.02	0.367	0.140	0.46	0.137	0.222	4.689	0.56
19	octane + nonane	298.15	-0.024	0.84	0.568	0.83	-0.018	-0.017	0.87	102954	116960	-0.063	0.74

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
20	octane + decane	298.15	0.079	0.60	0.661	0.62	0.100	-0.038	0.61	0.008	-0.028	111.1	0.50
21	octane + undecane	298.15	0.070	0.46	0.716	0.50	0.122	0.037	0.41	1.389	1.863	0.556	0.44
22	octane + dodecane	298.15	0.117	0.77	0.784	0.85	0.207	0.093	0.65	0.005	0.022	129.3	0.64
23	nonane + decane	298.15	0.037	0.68	0.755	0.69	0.041	-0.025	0.70	751478	691729	-0.039	0.68
24	nonane + undecane	298.15	0.014	0.69	0.826	0.70	0.038	0.060	0.63	0.206	0.315	4.203	0.63
25	nonane + dodecane	298.15	0.035	0.80	0.908	0.87	0.084	0.093	0.65	0.013	0.047	58.04	0.57
26	decane + undecane	298.15	0.027	0.47	0.964	0.46	0.033	0.045	0.36	2.939	3.360	0.449	0.37
27	decane + dodecane	298.15	0.039	0.92	1.071	0.91	0.061	0.096	0.69	0.015	0.078	62.02	0.64

Table S2. Correlating parameters and standard percentage deviations (SPD), σ(%) of McAllister's three-body and McAllister's four-body models for kinematic viscosities, ν of the binary systems of Group A: Aliphatic Alkane + Alkane.

No.	Name of the System	Temp. (K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
1	pentane + hexane	298.15	0.386	0.420	0.25	0.377	0.407	0.426	0.24
2	pentane + heptane	298.15	0.430	0.508	0.72	0.426	0.442	0.537	0.57
3	pentane + octane	293.15	0.485	0.599	0.36	0.441	0.552	0.620	0.29
4	pentane + nonane	298.15	0.539	0.731	0.13	0.483	0.627	0.772	0.13
5	pentane + decane	298.15	0.612	0.913	0.78	0.561	0.691	1.000	0.66
6	pentane + undecane	298.15	0.710	1.071	0.56	0.570	0.908	1.133	0.66
7	pentane + dodecane	298.15	0.840	1.245	0.31	0.674	1.006	1.372	0.30
8	hexane + heptane	298.15	0.488	0.532	0.37	0.480	0.508	0.542	0.40
9	hexane + octane	298.15	0.537	0.632	0.55	0.510	0.591	0.650	0.59

No.	Name of the System	Temp. (K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
10	hexane + nonane	298.15	0.601	0.757	0.62	0.551	0.689	0.786	0.66
11	hexane + decane	298.15	0.665	0.932	0.75	0.625	0.748	1.007	0.78
12	hexane + undecane	298.15	0.773	1.058	0.69	0.662	0.922	1.134	0.74
13	hexane + dodecane	298.15	0.882	1.253	0.45	0.731	1.067	1.365	0.37
14	heptane + octane	298.15	0.625	0.658	0.40	0.611	0.640	0.676	0.42
15	heptane + nonane	298.15	0.694	0.777	0.67	0.631	0.788	0.782	0.35
16	heptane + decane	298.15	0.745	0.976	0.70	0.716	0.813	1.042	0.70
17	heptane + undecane	298.15	0.845	1.116	0.37	0.761	0.972	1.192	0.38
18	heptane + dodecane	293.15	0.946	1.293	0.46	0.819	1.122	1.400	0.39
19	octane + nonane	298.15	0.778	0.852	0.87	0.735	0.872	0.839	0.69
20	octane + decane	298.15	0.863	1.035	0.61	0.855	0.896	1.095	0.51
21	octane + undecane	298.15	0.955	1.180	0.41	0.899	1.048	1.254	0.45
22	octane + dodecane	298.15	1.068	1.377	0.65	0.942	1.261	1.453	0.60
23	nonane + decane	298.15	1.002	1.101	0.70	0.979	1.055	1.113	0.73
24	nonane + undecane	298.15	1.108	1.244	0.63	1.031	1.224	1.269	0.51
25	nonane + dodecane	298.15	1.219	1.447	0.64	1.103	1.389	1.503	0.55
26	decane + undecane	298.15	1.291	1.354	0.36	1.273	1.296	1.398	0.35
27	decane + dodecane	298.15	1.425	1.560	0.69	1.331	1.533	1.605	0.73

Table S3. Correlating parameters and standard percentage deviations (SPD), σ(%) of Grunberg-Nissan, Hind, Heric and Ausländer models for dynamic viscosities, η of the binary systems of Group B: Aliphatic Alkane + Cycloalkane.

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
1	hexane + cyclohexane	298.15	-0.689	1.82	0.272	5.32	-0.648	-0.254	0.25	88.29	27.44	0.032	0.25
	,,	303.15	-0.658	1.93	0.266	5.08	-0.615	-0.277	0.45	14.60	4.792	0.223	0.20
	,,	308.15	-0.730	2.69	0.242	5.95	-0.670	-0.391	1.04	209.8	66.89	0.039	0.18
2	heptane + cyclohexane	298.15	-0.637	2.01	0.363	4.15	-0.601	-0.292	0.41	1.534	0.508	2.159	0.10
	,,	303.15	-0.603	1.87	0.351	3.80	-0.571	-0.270	0.46	70.79	22.90	0.052	0.32
3	octane + cyclohexane	298.15	-0.535	1.87	0.475	2.99	-0.466	-0.265	0.58	15.11	4.479	0.242	0.21
	,,	303.15	-0.524	1.69	0.449	2.71	-0.458	-0.236	0.62	0.07	-0.001	49.99	0.24
4	nonane + cyclohexane	298.15	-0.390	1.71	0.610	2.13	-0.365	-0.239	0.55	2.45	0.500	1.812	0.32
	,,	303.15	-0.373	1.76	0.574	2.14	-0.348	-0.247	0.54	2.48	0.534	1.884	0.36
5	decane + cyclohexane	298.15	-0.257	1.32	0.756	1.37	-0.120	-0.146	0.62	4.27	-10.14	3.846	0.41
	,,	303.15	-0.240	1.25	0.706	1.29	-0.103	-0.135	0.61	4.31	-14.39	4.898	0.40
	,,	308.15	-0.208	1.21	0.664	1.22	-0.071	-0.118	0.72	5.10	-42.20	10.17	0.50
6	heptane + cyclooctane	308.15	-0.881	3.01	0.191	11.5	-0.783	0.386	0.60	0.005	0.015	49.19	0.64
	,,	313.15	-0.825	2.59	0.211	10.3	-0.741	0.341	0.45	0.022	0.074	12.27	0.31
7	decane + cyclooctane	308.15	-0.571	2.23	0.733	4.37	-0.500	-0.325	0.57	2.84	1.148	1.145	0.32
	,,	313.15	-0.554	2.10	0.693	4.05	-0.487	-0.303	0.65	23.65	8.782	0.158	0.51

Table S4. Correlating parameters and standard percentage deviations (SPD), σ(%) of McAllister's three-body and McAllister's four-body models for kinematic viscosities, ν of the binary systems of Group B: Aliphatic Alkane + Cycloalkane.

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
1	hexane + cyclohexane	298.15	0.628	0.545	0.24	0.722	0.597	0.514	0.17
	,,	303.15	0.591	0.526	0.43	0.669	0.584	0.487	0.20

	,,	308.15	0.538	0.514	0.99	0.598	0.588	0.453	0.65
2	heptane + cyclohexane	298.15	0.686	0.655	0.39	0.762	0.702	0.615	0.14
	,,	303.15	0.653	0.621	0.44	0.721	0.665	0.585	0.34
3	octane + cyclohexane	298.15	0.777	0.787	0.55	0.827	0.832	0.740	0.21
	,,	303.15	0.736	0.738	0.59	0.776	0.789	0.695	0.12
4	nonane + cyclohexane	298.15	0.895	0.953	0.51	0.923	0.969	0.914	0.31
	,,	303.15	0.836	0.901	0.49	0.862	0.908	0.866	0.34
5	decane + cyclohexane	298.15	1.042	1.142	0.61	1.025	1.157	1.105	0.34
	,,	303.15	0.978	1.067	0.59	0.962	1.076	1.037	0.38
	,,	308.15	0.922	0.999	0.73	0.896	1.023	0.965	0.49
6	heptane + cyclooctane	308.15	0.730	0.917	0.59	0.658	0.840	1.128	0.58
	,,	313.15	0.687	0.876	0.43	0.620	0.800	1.062	0.29
7	decane + cyclooctane	308.15	1.300	1.246	0.54	1.445	1.344	1.144	0.33
	,,	313.15	1.225	1.153	0.53	1.358	1.235	1.075	0.51

Table S5. Correlating parameters and standard percentage deviations (SPD), σ(%) of Grunberg-Nissan, Hind, Heric and Ausländer models for dynamic viscosities, η of the binary systems of Group C: Aliphatic Alkane + Alkanol.

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
1	pentane + methanol	298.15	-0.225	0.57	0.288	1.56	0.116	0.009	0.20	1.733	0.917	1.166	0.21
2	hexane + methanol	298.15	-0.245	2.53	0.342	1.71	0.172	0.485	0.41	0.336	-0.123	4.323	0.25
3	pentane + ethanol	298.15	-0.819	2.79	0.142	6.42	-0.799	0.350	0.89	2.636	0.296	1.008	0.85
4	hexane + ethanol	293.15	-1.041	1.94	0.153	7.23	-0.862	0.115	1.74	0.957	-0.027	3.536	1.74
	,,	298.15	-1.059	1.47	0.151	6.68	-0.883	0.129	1.06	1.024	-0.043	3.287	0.84
5	heptane + ethanol	298.15	-0.950	0.91	0.282	4.80	-0.643	0.037	0.92	2.147	0.150	1.475	0.92
6	octane + ethanol	298.15	-0.791	0.39	0.423	2.42	-0.386	0.132	0.33	1.110	-0.116	2.715	0.32

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
7	pentane + 1-propanol	298.15	-0.966	4.58	-0.081	14.1	-1.140	0.647	1.62	6.250	0.663	0.436	0.47
8	hexane + 1-propanol	298.15	-1.198	2.12	-0.033	14.9	-1.217	0.278	0.79	3.983	0.329	0.838	0.40
9	heptane + 1-propanol	298.15	-1.387	0.44	0.024	12.3	-1.264	0.053	0.38	3.289	0.188	1.145	0.39
	,,	308.15	-1.350	0.40	0.072	10.6	-1.225	0.042	0.39	3.161	0.162	1.162	0.44
10	octane + 1-propanol	293.15	-1.308	0.74	0.169	10.0	-1.087	0.030	0.70	0.495	1.908	0.051	0.53
	,,	298.15	-1.291	0.90	0.187	9.47	-1.063	0.070	0.72	0.565	2.207	0.025	0.47
	,,	303.15	-1.281	0.93	0.196	8.87	-1.053	0.076	0.65	0.542	2.105	0.017	0.43
	,,	308.15	-1.265	1.06	0.205	8.31	-1.035	0.094	0.69	0.580	2.263	-0.010	0.48
	,,	313.15	-1.230	1.07	0.214	7.68	-1.001	0.096	0.60	0.527	2.019	0.006	0.48
	,,	318.15	-1.212	1.11	0.216	7.02	-0.985	0.089	0.80	0.659	2.541	-0.073	0.63
11	octane + 2-propanol	293.15	-2.091	4.70	-0.181	19.5	-1.691	-0.602	1.44	3.596	-0.024	1.585	0.60
	,,	298.15	-1.992	4.48	-0.086	17.3	-1.611	-0.578	1.19	3.426	-0.046	1.628	0.25
	,,	303.15	-1.891	4.37	-0.013	15.4	-1.526	-0.559	1.09	3.976	-0.005	1.353	0.55
12	decane + 2-propanol	293.15	-1.675	4.54	0.274	10.5	-1.191	-0.596	1.60	2.084	-0.359	2.964	0.58
	,,	298.15	-1.572	4.50	0.317	9.54	-1.100	-0.589	1.45	2.594	-0.364	2.352	0.86
	,,	303.15	-1.488	4.34	0.340	8.63	-1.029	-0.563	1.44	2.557	-0.450	2.401	0.86
13	dodecane + 2-propanol	293.15	-1.184	3.64	0.857	5.61	-0.614	-0.362	1.42	1.700	-1.406	4.459	0.43
	,,	298.15	-1.104	3.66	0.822	5.26	-0.540	-0.366	1.32	2.091	-1.759	3.853	0.43
	,,	303.15	-1.016	3.58	0.790	4.85	-0.459	-0.352	1.24	2.460	-2.236	3.476	0.51
14	hexane + 1-butanol	298.15	-1.055	4.23	-0.148	15.6	-1.198	0.452	0.52	3.213	0.200	1.031	0.55
15	heptane + 1-butanol	298.15	-0.987	0.19	-0.023	13.7	-0.937	-0.008	0.20	4.433	0.726	0.769	0.19
	,,	308.15	-1.161	0.40	-0.010	12.9	-1.122	0.021	0.39	3.965	0.495	0.888	0.43

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
16	octane + 1-butanol	293.15	-1.331	1.32	-0.002	13.2	-1.269	-0.137	0.59	0.391	1.450	0.100	0.58
	,,	298.15	-1.310	0.98	0.052	12.1	-1.240	-0.109	0.55	0.359	1.309	0.142	0.56
	,,	303.15	-1.296	0.83	0.090	11.1	-1.223	-0.098	0.46	0.362	1.300	0.136	0.48
	,,	308.15	-1.272	0.66	0.123	10.2	-1.196	-0.089	0.38	0.326	1.142	0.178	0.43
	,,	313.15	-1.250	0.45	0.146	9.50	-1.161	-0.034	0.44	0.374	1.333	0.144	0.47
	,,	318.15	-1.222	0.47	0.166	8.47	-1.137	-0.053	0.41	0.353	1.212	0.148	0.50
17	decane + 1-butanol	298.15	-1.243	0.81	0.418	6.90	-1.009	-0.067	0.48	1.738	-0.084	2.195	0.28
18	heptane + 1-pentanol	298.15	-1.068	2.71	-0.263	18.7	-1.111	0.162	1.55	1.941	0.093	1.943	1.35
	,,	308.15	-1.002	2.80	-0.078	14.7	-1.119	0.418	1.18	6.333	0.794	0.460	0.81
19	octane + 1-pentanol	293.15	-1.311	1.85	-0.277	18.9	-1.338	-0.205	0.98	0.262	0.972	0.280	1.17
	,,	298.15	-1.311	1.32	-0.177	17.4	-1.317	-0.138	0.75	0.281	1.054	0.272	0.97
	,,	303.15	-1.290	1.00	-0.085	15.7	-1.284	-0.100	0.64	0.292	1.081	0.281	0.83
	,,	308.15	-1.232	1.13	0.002	13.7	-1.228	-0.113	0.77	0.314	1.124	0.266	0.98
	,,	313.15	-1.196	0.97	0.058	12.4	-1.179	-0.069	0.82	0.354	1.262	0.246	1.08
	,,	318.15	-1.147	1.14	0.109	10.7	-1.135	-0.093	0.88	0.396	1.363	0.204	1.14
20	octane + 2-pentanol	293.15	-2.471	6.24	-0.814	33.8	-2.177	-0.736	0.50	16.99	1.215	0.325	0.44
	,,	298.15	-2.282	5.93	-0.517	28.1	-2.005	-0.745	0.59	14.32	1.147	0.381	0.28
	,,	303.15	-2.100	5.37	-0.304	23.4	-1.859	-0.690	0.67	13.89	1.237	0.372	0.42
21	dodecane + 2-pentanol	293.15	-2.009	7.21	0.175	14.8	-1.605	-1.043	1.71	6.990	-0.391	1.007	0.35
	,,	298.15	-1.818	6.67	0.339	12.7	-1.448	-0.967	1.72	6.504	-0.464	1.074	0.38
	,,	303.15	-1.641	6.07	0.445	10.8	-1.304	-0.879	1.76	5.399	-0.592	1.301	0.41
22	hexane + 1-hexanol	303.15	-0.435	7.06	-2.913	20.5	-0.692	0.778	1.44	4.437	0.433	0.601	1.36

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
	,,	313.15	-0.433	5.57	-0.741	15.1	-0.626	0.638	1.50	4.002	0.486	0.644	1.43
	,,	323.15	-0.417	4.37	0.420	11.8	-0.567	0.538	1.58	4.408	0.690	0.551	1.28
23	heptane + 1-hexanol	298.15	-0.786	4.05	-0.362	20.8	-0.847	0.189	2.90	1.724	0.084	2.100	3.22
		308.15	-0.841	2.98	-0.176	17.7	-0.897	0.184	2.08	2.376	0.223	1.465	2.21
24	dodecane + 1-hexanol	298.15	-2.181	11.1	-0.344	6.04	-2.329	-1.255	1.54	0.969	3.708	-0.982	1.72
25	hexane + 1-heptanol	303.15	-0.622	3.11	-0.761	33.9	-0.632	0.134	2.57	4.300	0.446	0.858	2.31
		313.15	-0.830	3.20	-0.450	28.7	-0.638	-0.402	3.93	1.170	0.100	3.681	2.09
26	heptane + 1-heptanol	298.15	-0.637	3.15	-0.610	25.8	-0.681	0.159	1.93	2.418	0.188	1.507	1.64
	,,	308.15	-0.560	3.78	-0.251	18.9	-0.669	0.378	0.79	3.139	0.331	0.996	1.18
27	dodecane + 1-heptanol	298.15	-2.140	49.9	-0.846	15.9	-2.986	-3.283	14.2	2.167	6.358	-0.942	5.79
28	dodecane + 2-heptanol	298.15	-2.193	9.86	-0.467	9.75	-2.374	-1.067	3.16	0.876	3.561	-0.869	3.47
29	hexane + 1-octanol	298.15	-0.015	7.83	-1.023	38.1	-0.174	0.512	2.08	3.901	0.306	0.792	0.60
30	heptane + 1-octanol	298.15	-0.123	2.91	-0.827	28.4	-0.183	0.208	1.68	2.960	0.309	1.079	2.77
	,,	308.15	0.070	5.32	-0.190	16.6	-0.075	0.428	2.06	2.235	0.221	1.187	3.26
31	octane + 1-octanol	298.15	-0.738	3.52	-0.935	31.7	-0.908	0.408	1.58	7.714	0.924	0.417	0.91
32	decane + 1-octanol	298.15	-0.983	1.43	-0.392	20.4	-1.042	0.179	0.61	6.426	0.901	0.513	0.41
33	dodecane + 1-octanol	298.15	-1.191	27.2	-0.173	5.57	-1.724	-2.034	8.29	1.430	3.543	-0.529	3.38
34	dodecane + 2-octanol	298.15	-1.725	9.96	-0.387	10.2	-1.932	-0.926	3.71	0.917	3.374	-0.494	3.22
35	hexane + 1-decanol	298.15	0.324	5.41	-2.023	55.6	0.362	0.265	2.25	4.080	0.290	0.802	1.69
36	heptane + 1-decanol	298.15	-0.070	0.10	-2.161	46.9	0.038	-0.025	0.15	5.076	0.565	0.702	0.30
37	octane + 1-decanol	298.15	-0.338	0.34	-1.943	38.3	-0.298	0.023	0.13	5.406	0.670	0.660	0.25
38	nonane + 1-decanol	298.15	-0.488	0.53	-1.435	30.5	-0.459	-0.023	0.47	7.266	1.122	0.474	0.74

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
39	decane + 1-decanol	298.15	-0.549	2.65	-0.975	25.4	-0.634	0.221	0.77	4.903	0.667	0.664	0.73
40	heptane + dodecanol	298.15	0.222	6.12	-3.097	60.5	0.786	-0.816	3.99	1.659	0.123	2.525	1.88
	,,	308.15	0.529	1.94	-1.359	37.0	0.832	-0.282	2.37	2.231	0.227	1.458	1.08

Table S6. Correlating parameters and standard percentage deviations (SPD), σ(%) of McAllister's three-body and McAllister's four-body models for kinematic viscosities, ν of the binary systems of Group C: Aliphatic Alkane + Alkanol.

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
1	pentane + methanol	298.15	0.621	0.474	0.32	0.644	0.521	0.455	0.21
2	hexane + methanol	298.15	0.778	0.464	0.38	0.745	0.597	0.465	0.40
3	pentane + ethanol	298.15	0.813	0.408	0.92	0.943	0.556	0.410	0.85
4	hexane + ethanol	293.15	0.810	0.473	1.67	0.898	0.695	0.427	1.75
	,,	298.15	0.754	0.450	1.80	0.820	0.674	0.400	1.07
5	heptane + ethanol	298.15	0.858	0.606	0.97	0.976	0.688	0.614	0.86
6	octane + ethanol	298.15	1.014	0.731	0.31	1.088	0.847	0.734	0.34
7	pentane + 1-propanol	298.15	1.144	0.403	1.55	1.457	0.583	0.454	0.43
8	hexane + 1-propanol	298.15	1.070	0.511	0.81	1.340	0.702	0.522	0.42
9	heptane + 1-propanol	298.15	1.017	0.598	0.38	1.260	0.777	0.591	0.40
	,,	308.15	0.869	0.534	0.40	1.068	0.672	0.535	0.41
10	octane + 1-propanol	293.15	0.814	1.243	0.64	0.777	1.045	1.480	0.52
	,,	298.15	0.772	1.127	0.66	0.730	0.981	1.329	0.49
	,,	303.15	0.724	1.030	0.58	0.692	0.900	1.212	0.41

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
	,,	308.15	0.684	0.942	0.63	0.654	0.839	1.101	0.47
	,,	313.15	0.645	0.869	0.54	0.624	0.772	1.015	0.45
	,,	318.15	0.607	0.806	0.75	0.584	0.731	0.928	0.61
11	octane + 2-pentanol	293.15	0.891	0.822	1.34	1.139	0.993	0.726	0.75
	,,	298.15	0.822	0.770	1.09	1.038	0.907	0.692	0.51
	,,	303.15	0.759	0.725	1.01	0.952	0.825	0.664	0.52
12	decane + 2-pentanol	293.15	1.189	1.293	1.50	1.378	1.462	1.139	0.76
	,,	298.15	1.087	1.208	1.35	1.257	1.310	1.088	0.93
	,,	303.15	0.999	1.120	1.35	1.138	1.206	1.014	0.90
13	dodecane + 2-pentanol	293.15	1.727	1.901	1.33	1.808	2.096	1.729	0.68
	,,	298.15	1.557	1.756	1.24	1.621	1.886	1.611	0.67
	,,	303.15	1.422	1.623	1.16	1.469	1.711	1.501	0.63
14	hexane + 1-butanol	298.15	1.341	0.526	0.53	1.655	0.858	0.503	0.67
15	heptane + 1-butanol	298.15	1.336	0.754	0.19	1.656	1.009	0.700	0.17
	,,	308.15	1.048	0.611	0.38	1.301	0.799	0.588	0.40
16	octane + 1-butanol	293.15	0.815	1.514	0.59	0.783	1.144	1.861	0.70
	,,	298.15	0.768	1.367	0.56	0.752	1.033	1.683	0.63
	,,	303.15	0.721	1.242	0.47	0.712	0.948	1.523	0.51
	,,	308.15	0.679	1.135	0.39	0.681	0.864	1.392	0.39
	,,	313.15	0.650	1.027	0.44	0.643	0.817	1.246	0.47
	,,	318.15	0.609	0.950	0.41	0.612	0.751	1.148	0.44
17	decane + 1-butanol	298.15	1.577	1.165	0.43	1.841	1.399	1.133	0.26

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
18	heptane + 1-pentanol	298.15	1.634	0.740	1.43	1.973	1.294	0.597	1.34
	,,	308.15	1.426	0.591	1.11	1.827	0.823	0.632	0.83
19	octane + 1-pentanol	293.15	0.869	1.854	0.98	0.849	1.259	2.375	0.99
	,,	298.15	0.825	1.640	0.76	0.797	1.169	2.085	0.84
	,,	303.15	0.781	1.472	0.65	0.755	1.078	1.859	0.72
	,,	308.15	0.733	1.354	0.78	0.714	0.997	1.690	0.83
	,,	313.15	0.701	1.226	0.83	0.674	0.940	1.512	0.93
	,,	318.15	0.656	1.135	0.89	0.634	0.877	1.381	0.99
20	octane + 2-pentanol	293.15	1.021	0.892	0.50	1.514	0.952	0.859	0.53
	,,	298.15	0.930	0.854	0.57	1.327	0.924	0.796	0.29
	,,	303.15	0.865	0.801	0.65	1.201	0.860	0.751	0.43
21	dodecane + 2-pentanol	293.15	1.474	2.127	1.65	1.824	2.149	1.824	0.40
	,,	298.15	1.359	1.932	1.67	1.627	1.971	1.663	0.36
	,,	303.15	1.265	1.755	1.70	1.465	1.821	1.516	0.34
22	hexane + 1-hexanol	303.15	21.33	5.907	1.38	25.99	11.09	5.552	1.34
	,,	313.15	17.00	5.455	1.52	20.65	9.246	5.283	1.25
	,,	323.15	13.81	5.025	1.63	16.87	7.677	5.047	1.20
23	heptane + 1-hexanol	298.15	2.095	0.857	2.75	2.457	1.729	0.604	3.50
	,,	308.15	1.670	0.734	2.05	2.029	1.236	0.609	2.27
24	dodecane + 1-hexanol	298.15	0.784	2.680	1.51	0.888	1.605	3.089	1.44
25	hexane + 1-heptanol	303.15	2.101	0.788	2.53	2.700	1.362	0.637	2.34
	,,	313.15	1.397	0.800	3.78	1.750	1.315	0.540	2.35

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
26	heptane + 1-heptanol	298.15	2.556	0.987	1.78	3.119	1.898	0.718	1.69
	,,	308.15	2.219	0.783	0.70	2.708	1.387	0.674	1.03
27	dodecane + 1-heptanol	298.15	0.342	4.966	13.87	0.229	3.096	4.062	4.15
28	dodecane + 2-heptanol	298.15	0.863	2.678	3.15	0.970	1.650	3.202	2.99
29	hexane + 1-octanol	298.15	3.674	0.963	2.00	4.502	2.047	0.734	0.76
30	heptane + 1-octanol	298.15	3.553	1.228	1.66	4.325	2.368	0.883	2.79
	,,	308.15	3.096	0.990	1.97	3.530	2.102	0.694	3.43
31	octane + 1-octanol	298.15	3.323	1.105	1.51	4.417	1.711	1.111	1.14
32	decane + 1-octanol	298.15	3.473	1.560	0.59	4.516	2.192	1.522	0.51
33	dodecane + 1-octanol	298.15	0.870	5.890	8.12	0.642	3.825	5.458	2.87
34	dodecane + 2-octanol	298.15	1.137	3.491	3.67	1.099	2.384	4.014	3.01
35	hexane + 1-decanol	298.15	5.260	1.381	2.20	6.562	2.942	0.946	1.28
36	heptane + 1-decanol	298.15	4.752	1.658	0.16	6.228	2.830	1.264	0.10
37	octane + 1-decanol	298.15	4.782	1.769	0.13	6.274	2.914	1.427	0.14
38	nonane + 1-decanol	298.15	4.883	2.021	0.46	6.453	3.034	1.738	0.77
39	decane + 1-decanol	298.15	5.361	2.018	0.76	6.830	3.299	1.757	0.76
40	heptane + dodecanol	298.15	5.587	2.879	3.94	7.209	4.850	1.533	2.03
	,,	308.15	5.196	2.052	2.36	6.372	3.691	1.260	1.22

Table S7. Correlating parameters and standard percentage deviations (SPD), σ(%) of Grunberg-Nissan, Hind, Heric and Ausländer models for dynamic viscosities, η of the binary systems of Group D: Aliphatic Cycloalkane + Alkanol.

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
1	cyclopentane + ethanol	293.15	-0.380	3.40	0.483	1.37	-0.369	-0.470	1.09	0.360	0.523	0.550	1.54
	,,	298.15	-0.397	3.31	0.451	1.33	-0.383	-0.465	0.99	0.427	0.641	0.388	1.37
	,,	303.15	-0.402	3.28	0.424	1.40	-0.387	-0.472	0.98	0.361	0.507	0.479	1.35
2	cyclopentane + 1-propanol	293.15	-0.311	5.28	0.456	0.90	-0.445	-0.590	1.13	0.725	1.424	0.131	0.65
	,,	298.15	-0.331	5.05	0.438	0.74	-0.456	-0.577	1.06	0.759	1.475	0.118	0.66
	,,	303.15	-0.348	4.79	0.419	0.62	-0.463	-0.552	0.97	0.829	1.611	0.095	0.57
3	cyclopentane + 1-butanol	298.15	-0.203	5.39	0.406	3.08	-0.369	-0.580	0.67	0.451	0.893	0.364	0.72
4	cyclopentane + 2-propanol	293.15	-1.093	2.71	0.072	9.71	-1.154	-0.255	1.01	0.589	1.966	0.026	0.57
	,,	298.15	-1.074	2.53	0.121	8.29	-1.132	-0.258	0.84	0.589	1.905	0.024	0.52
	,,	303.15	-1.037	2.28	0.161	7.08	-1.094	-0.264	0.61	0.519	1.603	0.061	0.54
5	cyclopentane + 2-butanol	293.15	-1.110	4.20	-0.262	17.5	-1.255	-0.418	1.10	0.358	1.241	0.122	1.28
	,,	298.15	-1.067	3.68	-0.100	14.1	-1.191	-0.380	1.05	0.389	1.297	0.130	1.20
	,,	303.15	-0.998	3.28	0.024	11.3	-1.105	-0.351	0.99	0.422	1.340	0.144	1.12
6	cyclopentane + 2-pentanol	293.15	-0.952	4.24	-0.280	18.6	-1.142	-0.595	2.03	0.126	0.352	0.937	0.55
	,,	298.15	-0.885	3.48	-0.079	14.6	-1.031	-0.505	1.66	0.120	0.314	1.181	0.66
	,,	303.15	-0.913	1.80	0.011	13.2	-0.964	-0.238	0.62	0.202	0.617	0.717	0.43
7	cyclohexane + ethanol	293.15	-0.516	1.23	0.804	1.15	-0.339	-0.129	1.03	3.299	14.25	-1.350	0.41
	,,	298.15	-0.519	1.14	0.734	1.07	-0.342	-0.124	0.95	3.042	13.46	-1.436	0.29
	,,	303.15	-0.516	1.02	0.674	0.95	-0.338	-0.121	0.83	2.754	12.34	-1.531	0.22
8	cyclohexane + 1-propanol	293.15	-0.533	3.13	0.941	1.25	-0.533	-0.434	0.84	1.021	1.871	-0.133	0.86

No.	Name of the System	Temp.(K)	GN		HI		HE			AU			
			G_{12}	σ(%)	η_{12}	σ(%)	α_{12}	α'_{12}	σ(%)	A_{21}	B_{12}	B_{21}	σ(%)
	,,	298.15	-0.543	2.95	0.853	1.18	-0.537	-0.412	0.82	1.016	1.888	-0.149	0.84
	,,	303.15	-0.567	2.60	0.769	0.95	-0.554	-0.362	0.76	1.136	2.257	-0.174	0.78
9	cyclohexane + 1-butanol	293.15	-0.473	4.10	0.996	0.92	-0.555	-0.528	0.63	0.878	1.595	0.008	0.59
	,,	298.15	-0.488	3.92	0.904	0.92	-0.566	-0.523	0.52	0.817	1.464	0.011	0.52
	,,	303.15	-0.495	3.60	0.828	0.84	-0.565	-0.500	0.40	0.695	1.215	0.054	0.49
10	cyclohexane + 1-hexanol	303.15	-0.299	3.38	9.056	1.97	-0.363	0.377	0.75	1.457	0.263	1.400	0.75
	,,	313.15	-0.239	3.39	8.543	1.30	-0.309	0.440	1.15	12.58	4.152	0.073	1.80
11	cyclohexane + 1-octanol	303.15	0.070	0.30	0.967	5.13	0.181	-0.055	0.33	1.485	0.450	1.554	0.10
12	cyclohexane + 1-decanol	308.15	1.028	5.60	2.067	6.10	1.148	-0.304	3.59	1.113	1.454	0.157	1.26
13	cyclohexane + 2-propanol	293.15	-1.172	1.02	0.553	3.66	-1.135	-0.130	0.61	0.601	1.983	-0.382	0.60
	,,	298.15	-1.141	0.97	0.529	3.13	-1.103	-0.131	0.50	0.655	2.161	-0.447	0.51
	,,	303.15	-1.107	0.94	0.506	2.78	-1.066	-0.122	0.64	0.608	1.966	-0.510	0.64
14	cyclohexane + 2-butanol	293.15	-1.419	2.11	0.242	9.42	-1.451	-0.172	2.40	0.094	0.246	0.788	2.13
	,,	298.15	-1.358	2.08	0.317	8.24	-1.373	-0.110	2.34	0.090	0.228	0.854	2.14
	,,	303.15	-1.287	2.20	0.369	7.27	-1.289	-0.057	2.40	0.084	0.200	0.959	2.11
15	cyclohexane + 2-pentanol	293.15	-1.332	3.41	0.216	9.56	-1.438	-0.438	3.54	0.149	0.378	0.297	1.38
	,,	298.15	-1.251	2.97	0.328	8.00	-1.329	-0.352	3.20	0.149	0.362	0.357	1.27
	,,	303.15	-1.252	2.08	0.349	7.52	-1.281	-0.146	2.33	0.200	0.583	0.211	1.35

Table S8. Correlating parameters and standard percentage deviations (SPD), σ(%) of McAllister's three-body and McAllister's four-body models for kinematic viscosities, ν of the binary systems of Group D: Aliphatic Cycloalkane + Alkanol.

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
1	cyclopentane + ethanol	293.15	0.604	1.137	1.09	0.620	0.789	1.240	1.26
	,,	298.15	0.568	1.050	1.00	0.584	0.735	1.143	1.14
	,,	303.15	0.533	0.977	0.99	0.556	0.678	1.067	1.10
2	cyclopentane + 1-propanol	293.15	0.696	1.708	1.11	0.635	1.158	1.871	0.68
	,,	298.15	0.650	1.545	1.03	0.597	1.064	1.687	0.66
	,,	303.15	0.612	1.402	0.94	0.559	0.994	1.520	0.56
3	cyclopentane + 1-butanol	298.15	0.716	1.897	2.43	0.640	1.236	2.099	2.29
4	cyclopentane + 2-propanol	293.15	0.641	1.306	0.99	0.587	0.989	1.568	0.63
	,,	298.15	0.597	1.176	0.83	0.560	0.889	1.406	0.56
	,,	303.15	0.558	1.068	0.61	0.541	0.792	1.278	0.55
5	cyclopentane + 2-butanol	293.15	0.666	1.730	1.09	0.607	1.147	2.151	1.44
	,,	298.15	0.630	1.520	1.04	0.582	1.034	1.869	1.31
	,,	303.15	0.598	1.354	0.99	0.560	0.941	1.644	1.19
6	cyclopentane + 2-pentanol	293.15	0.671	2.006	1.97	0.767	0.972	2.650	0.68
	,,	298.15	0.652	1.746	1.60	0.729	0.902	2.272	0.88
	,,	303.15	0.668	1.447	0.61	0.659	0.935	1.827	0.43
7	cyclohexane + ethanol	293.15	1.100	1.283	0.98	1.060	1.324	1.251	0.30
	,,	298.15	1.013	1.175	0.89	0.981	1.206	1.151	0.18
	,,	303.15	0.938	1.082	0.78	0.917	1.094	1.068	0.27
8	cyclohexane + 1-propanol	293.15	1.161	2.005	0.84	1.185	1.514	2.160	0.88
	,,	298.15	1.066	1.791	0.83	1.090	1.368	1.931	0.87
	,,	303.15	0.988	1.591	0.76	1.004	1.253	1.713	0.80
9	cyclohexane + 1-butanol	293.15	1.246	2.529	0.63	1.216	1.833	2.732	0.64

No.	Name of the System	Temp.(K)	MC3			MC4			
			ν_{12}	ν_{21}	σ(%)	ν_{1112}	ν_{1122}	ν_{2221}	σ(%)
	,,	298.15	1.130	2.246	0.52	1.123	1.613	2.439	0.54
	,,	303.15	1.037	1.996	0.40	1.055	1.417	2.188	0.41
10	cyclohexane + 1-hexanol	303.15	28.34	13.52	0.74	31.36	20.63	12.19	0.78
	,,	313.15	23.38	11.27	1.15	26.79	14.90	11.46	1.38
11	cyclohexane + 1-octanol	303.15	4.011	2.157	0.33	4.660	3.005	1.758	0.12
12	cyclohexane + 1-decanol	308.15	2.668	6.914	3.53	1.746	5.209	6.882	1.79
13	cyclohexane + 2-propanol	293.15	1.096	1.604	0.62	1.147	1.294	1.897	0.63
	,,	298.15	0.999	1.432	0.51	1.045	1.173	1.675	0.53
	,,	303.15	0.920	1.281	0.65	0.976	1.043	1.501	0.64
14	cyclohexane + 2-butanol	293.15	1.124	1.921	2.39	1.353	1.183	2.574	2.37
	,,	298.15	1.049	1.662	2.34	1.235	1.084	2.194	2.39
	,,	303.15	0.983	1.454	2.39	1.143	0.989	1.897	2.48
15	cyclohexane + 2-pentanol	293.15	1.069	2.243	3.52	1.445	1.103	3.087	0.63
	,,	298.15	1.012	1.931	3.18	1.329	1.014	2.622	0.58
	,,	303.15	0.991	1.606	2.33	1.172	1.025	2.108	0.87

Table I. Comparison of standard percentage deviations (SPD), σ(%) of six investigated models for the binary systems of Group A: Aliphatic Alkane + Alkane.

No.	Name of the System	SPD, σ(%) values					
		GN	HI	HE	AU	MC3	MC4
1	pentane + hexane [44]	0.24	0.23	0.25	0.22	0.25	0.24
2	pentane + heptane [44]	0.69	0.70	0.74	0.73	0.72	0.57
3	pentane + octane [44]	0.40	0.34	0.35	0.36	0.36	0.29

4	pentane + nonane [44]	0.17	0.26	0.12	0.13	0.13	0.13
5	pentane + decane [44]	0.74	0.97	0.85	0.56	0.78	0.66
6	pentane + undecane [44]	0.74	0.69	0.55	0.65	0.56	0.66
7	pentane + dodecane [44]	1.83	0.66	0.40	0.30	0.31	0.30
8	hexane + heptane [44]	0.38	0.38	0.37	0.38	0.37	0.40
9	hexane + octane [44]	0.53	0.53	0.55	0.59	0.55	0.59
10	hexane + nonane [44]	0.59	0.59	0.62	0.66	0.62	0.66
11	hexane + decane [44]	0.72	0.81	0.76	0.71	0.75	0.78
12	hexane + undecane [44]	1.00	0.89	0.69	0.74	0.69	0.74
13	hexane + dodecane [44]	1.23	1.06	0.42	0.50	0.45	0.37
14	heptane + octane [44]	0.49	0.51	0.40	0.42	0.40	0.42
15	heptane + nonane [44]	0.75	0.75	0.67	0.46	0.67	0.35
16	heptane + decane [44]	0.71	0.76	0.70	0.57	0.70	0.70
17	heptane + undecane [44]	0.50	0.48	0.36	0.34	0.37	0.38
18	heptane + dodecane [44]	0.87	1.02	0.46	0.56	0.46	0.39
19	octane + nonane [44]	0.84	0.83	0.87	0.74	0.87	0.69
20	octane + decane [44]	0.60	0.62	0.61	0.50	0.61	0.51
21	octane + undecane [44]	0.46	0.50	0.41	0.44	0.41	0.45
22	octane + dodecane [44]	0.77	0.85	0.65	0.64	0.65	0.60

23	nonane + decane [44]	0.68	0.69	0.70	0.68	0.70	0.73
24	nonane + undecane [44]	0.69	0.70	0.63	0.63	0.63	0.51
25	nonane + dodecane [44]	0.80	0.87	0.65	0.57	0.64	0.55
26	decane + undecane [44]	0.47	0.46	0.36	0.37	0.36	0.35
27	decane + dodecane [44]	0.92	0.91	0.69	0.64	0.69	0.73
	OASPD, σ(%) values	0.70	0.67	0.55	0.52	0.55	0.51

Table II. Comparison of average standard percentage deviations (ASPD), σ(%) of six investigated models for the binary systems of Group B: Aliphatic Alkane + Cycloalkane.

No.	Name of the System	Temp. Range (K)	ASPD, σ(%) values					
			GN	HI	HE	AU	MC3	MC4
1	hexane + cyclohexane [45]	298.15 – 303.15	2.15	5.45	0.58	0.20	0.55	0.34
2	heptane + cyclohexane [45]	298.15 - 308.15	1.94	3.98	0.43	0.18	0.42	0.24
3	octane + cyclohexane [45]	298.15 - 308.15	1.78	2.85	0.60	0.23	0.57	0.16
4	nonane + cyclohexane [45]	298.15 - 308.15	1.74	2.13	0.54	0.30	0.50	0.32
5	decane + cyclohexane [45]	298.15 - 308.15	1.26	1.29	0.65	0.44	0.65	0.40
6	heptane + cyclooctane [56]	308.15 - 313.15	2.80	10.9	0.53	0.47	0.51	0.43
7	decane + cyclooctane [60]	308.15 - 313.15	2.16	4.21	0.61	0.42	0.54	0.42
	OASPD, σ(%) values		1.98	4.40	0.56	0.32	0.53	0.33

Table III. Comparison of average standard percentage deviations (ASPD), σ(%) of six investigated models for the binary systems of Group C: Aliphatic Alkane + Alkanol.

No.	Name of the System	Temp. Range (K)	ASPD, σ(%) values					
			GN	HI	HE	AU	MC3	MC4
1	pentane + methanol [61]	298.15	0.57	1.56	0.20	0.21	0.32	0.21
2	hexane + methanol [61]	298.15	2.53	1.71	0.41	0.25	0.38	0.40
3	pentane + ethanol [61]	298.15	2.79	6.42	0.89	0.85	0.92	0.85
4	hexane + ethanol [62]	293.15 - 298.15	1.70	6.96	1.40	1.29	1.74	1.41
5	heptane + ethanol [61]	298.15	0.91	4.80	0.92	0.92	0.97	0.86
6	octane + ethanol [61]	298.15	0.39	2.42	0.33	0.32	0.31	0.34
7	pentane + 1-propanol [61]	298.15	4.58	14.1	1.62	0.47	1.55	0.43
8	hexane + 1-propanol [61]	298.15	2.12	14.9	0.79	0.40	0.81	0.42
9	heptane + 1-propanol [63]	298.15 - 308.15	0.42	11.4	0.38	0.41	0.39	0.40
10	octane + 1-propanol [65]	293.15 - 318.15	0.97	8.57	0.69	0.50	0.63	0.49
11	octane + 2-propanol [46]	293.15 - 303.15	4.52	17.4	1.24	0.47	1.15	0.59
12	decane + 2-propanol [46]	293.15 - 303.15	4.46	9.55	1.50	0.77	1.40	0.86
13	dodecane + 2-propanol [46]	293.15 - 303.15	3.63	5.24	1.33	0.46	1.24	0.66

No.	Name of the System	Temp. Range (K)	ASPD, σ(%) values					
			GN	HI	HE	AU	MC3	MC4
14	hexane + 1-butanol [66]	298.15	4.23	15.6	0.52	0.55	0.53	0.67
15	heptane + 1-butanol [63]	298.15 - 308.15	0.29	13.3	0.30	0.31	0.28	0.28
16	octane + 1-butanol [65]	293.15 - 318.15	0.78	10.8	0.47	0.50	0.47	0.52
17	decane + 1-butanol [66]	298.15	0.81	6.90	0.48	0.28	0.43	0.26
18	heptane + 1-pentanol [64]	298.15 - 308.15	2.75	16.7	1.37	1.08	1.27	1.09
19	octane + 1-pentanol [65]	293.15 - 318.15	1.23	14.8	0.81	1.03	0.81	0.88
20	octane + 2-pentanol [47]	293.15 - 303.15	5.85	28.4	0.59	0.38	0.57	0.41
21	dodecane + 2-pentanol [47]	293.15 - 303.15	6.65	12.8	1.73	0.38	1.67	0.37
22	hexane + 1-hexanol [48]	303.15 - 323.15	5.67	15.8	1.51	1.36	1.51	1.26
23	heptane + 1-hexanol [64]	298.15 - 308.15	3.51	19.3	2.49	2.72	2.40	2.89
24	dodecane + 1-hexanol [49]	298.15	11.1	6.04	1.54	1.72	1.51	1.44
25	hexane + 1-heptanol [50]	303.15 - 313.15	3.15	31.3	3.25	2.20	3.15	2.34
26	heptane + 1-heptanol [64]	298.15 - 308.15	3.47	22.4	1.36	1.41	1.24	1.36
27	dodecane + 1-heptanol [49]	298.15	49.9	15.9	14.2	5.79	13.9	4.15
28	dodecane + 2-heptanol [49]	298.15	9.86	9.75	3.16	3.47	3.15	2.99
29	hexane + 1-octanol [51]	298.15	7.83	38.1	2.08	0.60	2.00	0.76
30	heptane + 1-octanol [64]	298.15 - 308.15	4.12	22.5	1.87	3.02	1.82	3.11

No.	Name of the System	Temp. Range (K)	ASPD, σ(%) values					
			GN	HI	HE	AU	MC3	MC4
31	octane + 1-octanol [51]	298.15	3.52	31.7	1.58	0.91	1.51	1.14
32	decane + 1-octanol [51]	298.15	1.43	20.4	0.61	0.41	0.59	0.51
33	dodecane + 1-octanol [49]	298.15	27.2	5.57	8.29	3.38	8.12	2.87
34	dodecane + 2-octanol [49]	298.15	9.96	10.2	3.71	3.22	3.67	3.01
35	hexane + 1-decanol [52]	298.15	5.41	55.6	2.25	1.69	2.20	1.28
36	heptane + 1-decanol [53]	298.15	0.10	46.9	0.15	0.30	0.16	0.10
37	octane + 1-decanol [52]	298.15	0.34	38.3	0.13	0.25	0.13	0.14
38	nonane + 1-decanol [53]	298.15	0.53	30.5	0.47	0.74	0.46	0.77
39	decane + 1-decanol [53]	298.15	2.65	25.4	0.77	0.73	0.76	0.76
40	heptane + dodecanol [64]	298.15 - 308.15	4.03	48.8	3.18	1.48	3.15	1.63
	OASPD, σ(%) values		5.15	17.96	1.76	1.18	1.73	1.12

Table IV. Comparison of average standard percentage deviations (ASPD), σ(%) of six investigated models for the binary systems of Group D: Aliphatic Cycloalkane + Alkanol.

No.	Name of the System	Temp. Range (K)	ASPD, σ(%) values					
			GN	HI	HE	AU	MC3	MC4
1	cyclopentane + ethanol [54]	293.15 - 303.15	3.33	1.36	1.02	1.42	1.03	1.17

2	cyclopentane + 1-propanol [54]	293.15 - 303.15	5.04	0.75	1.05	0.63	1.03	0.64
3	cyclopentane + 1-butanol [55]	298.15	5.39	3.08	0.67	0.72	2.43	2.29
4	cyclopentane + 2-propanol [57]	293.15 - 303.15	2.51	8.36	0.82	0.54	0.81	0.58
5	cyclopentane + 2-butanol [57]	293.15 - 303.15	3.72	14.29	1.05	1.20	1.04	1.31
6	cyclopentane + 2-pentanol [57]	293.15 - 303.15	3.17	15.46	1.44	0.55	1.39	0.66
7	cyclohexane + ethanol [54]	293.15 - 303.15	1.13	1.06	0.94	0.31	0.88	0.25
8	cyclohexane + 1-propanol [54]	293.15 - 303.15	2.89	1.13	0.81	0.82	0.81	0.85
9	cyclohexane + 1-butanol [54]	293.15 - 303.15	3.87	0.89	0.51	0.53	0.51	0.53
10	cyclohexane + 1-hexanol [48]	303.15 - 323.15	3.38	1.64	0.95	1.28	0.94	1.08
11	cyclohexane + 1-octanol [58]	303.15	0.30	5.13	0.33	0.10	0.33	0.12
12	cyclohexane + 1-decanol [59]	308.15	5.60	6.10	3.59	1.26	3.53	1.79
13	cyclohexane + 2-propanol [57]	293.15 - 303.15	0.98	3.19	0.59	0.59	0.60	0.60
14	cyclohexane + 2-butanol [57]	293.15 - 303.15	2.13	8.31	2.38	2.12	2.37	2.41
15	cyclohexane + 2-pentanol [57]	293.15 - 303.15	2.82	8.36	3.03	1.33	3.01	0.70
	OASPD, σ(%) values		3.08	5.27	1.28	0.89	1.38	1.00