Modified Berge Method for the Correlation of Experimental P-T Natural Gas (NG) Hydrates Formation Curve, and Use of NG Specific Gravity as a Tool for Its Compositional Characterization Through Functional Chemical Group Contribution

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The method proposed by Berge[1] to "predict" natural gas hydrates (NGH) temperature formation as a function of NG specific gravity (g_g) was modified to correlate P-T experimental NGH formation data by considering an extended specific gravity interval ($0.555 \leq g_g < 1.0$), instead of the two intervals used in the original method, using 7 adjustable parameters per interval. Now, it is possible to represent the P-T NGH curve using only 7 adjustable parameters, covering the temperature and pressure ranges: 272.04 to 297.04 K, and 496.4 to 23442.2 kPa, respectively. g_g as a parameter to correlate P-T NGH formation was introduced by Katz [2]. g_g is a dimensionless parameter evaluated as the ratio of the density of NG to that of water (both at ambient temperature). Methods available for the purposes of this work include that of Kobayashi et al. (1987), Motiee [3] and Hammerschmidt [4], which use 15 and 12 adjustable parameters, respectively, while, Hammerschmidt's method is only applicable for a given g_g. We present the results of the 7 parameters obtained using the available experimental information (28 experimental data from 7 pressure-temperature NGH curves), with an average relative error of 1.73 %. Taking advantage of this method with new NGH formation experimental P-T data from which we can extract a g_g, which best fits the P-T data for a given NG, we can now use g_g values to estimate a "compositional analysis" of the NG through the use of a group contribution method recently developed by one of the authors.

[1]Berge, B.K. 1986. Paper 15306 presented at the 1986 Symposium on Petroleum Industry Applications of Microcomputers.
[2] Katz, D.I. 1959. Handbook of Natural Gas Engineering. McGraw-Hill, New York.
[3]Motiee, M. 1991. Hyd. Proc, July, pp. 98.
[4] Hammerschmidt, E.G. 1936. Am. Gas Assoc. Monthly, Vol. 18, pp. 278.