

PREFACE

This volume presents solubility data for binary systems in which one component is a hydrocarbon containing 5, 6 or 7 carbon atoms and the second component is water, heavy water or seawater. Other volumes in this series either presently available or in preparation present analogous data for other hydrocarbons. The interested reader should consult the Solubility Data Series list of volume titles on page 528. For this volume seawater has been defined as, "all natural waters, synthetic seawater and aqueous solutions in which sodium chloride predominates."

A variety of units for the expression of solubility has appeared in the primary literature. For the purpose of comparison the compilers of this volume have, so far as possible, expressed all original results in terms of mass percent and mole fraction as well as the units presented by the original investigators. Where such conversions have been made, they are clearly attributed to the compiler and the source of any data not provided by the original investigators (such as hydrocarbon or seawater density) is specified. Definitions of mass percent and mole fraction as well as their relationship to other common measures of solubility are given in the Introduction to this volume.

The expression of the solubility of a hydrocarbon in natural seawater on a mole fraction basis presents special difficulties since the composition of seawater is not fully known and somewhat variable. However, the uncertainty introduced by this factor is generally less than 3%, smaller than the measurement uncertainty associated with many of these data. Some of the data for hydrocarbon solubility in seawater have been presented in terms of the Setschenow (also transliterated Sechenov and Setchenoff) equation. A thorough discussion, "The Sechenov Salt Effect Parameter", is presented in Volume 10 of this series (pp. xxix-xliii).

By far the most common approach to the measurement of solubility in hydrocarbon/water systems has been to prepare a saturated solution and then to analytically determine the concentration of the less abundant component. In these systems of low solubility the careful preparation of saturated solutions is critically important. The presence of only a small amount of the minor component in the form of colloidal droplets can significantly influence the solubility results obtained. This can lead to major positive systematic errors. Unfortunately, lack of experimental detail in some published reports makes these errors extremely difficult to evaluate. Users of this volume are advised to be aware of this potential source of error, especially for systems where only one or a few measurements have been reported or when solubilities are very low.

Another approach to evaluating solubility data in these systems is to determine whether a particular result fits into a "reasonable" trend for a series of related compounds. While this approach undoubtedly has qualitative value, it must be used with caution. For instance, the solubilities of anthracene and phenanthrene differ by about a factor of 20; a fact that is supported by careful experimentation but not by "reasonable" inference.

Most measurements of hydrocarbon/water solubility have been made within the temperature range considered "room temperature" (275-300 K). In many reports system pressure is unspecified but can be assumed to be approximately 100 kPa (1 atm). Some measurements at elevated temperatures have been in sealed tubes. Generally the system pressure for these measurements is not known. For most purposes this lack of specification of system pressure is not important since hydrocarbon/water solubilities do not vary strongly with pressure.

This volume is the result of a careful search of the chemical literature. The goal of that search was to include all published data for the systems indicated in the title. Each evaluation includes a closing date for the literature search of that system, November 1981 or later. In spite of these efforts, some published measurements may have been missed. The editor will appreciate having his attention brought to any omitted source of solubility data for inclusion in future volumes.

The compilation and critical evaluation of solubility data presented here was a group effort. Each participant brought an individual style to the work. The editor's goal was to ensure that all text is simple, unambiguous English; not to attempt stylistic uniformity. Finally, the editor wishes to acknowledge the dedicated efforts of the compilers, evaluators and reviewers whose efforts have resulted in this volume, and especially to thank Mauricette Nicpon, Sheila Chapin and Bronwyn Airey for final typing.

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