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API Tech Data Book 10

API TECHNICAL DATA BOOK - 10<sup>th</sup> Edition

### 13C Diffusivity in Gas-Liquid Systems

#### 13C1 Gas - Liquid Systems

##### Procedure 13C1.1 - Diffusion Coefficients of Dissolved Gases in Liquids

(1980)

**Discussion**

The following equation is recommended for estimating diffusion coefficients of dissolved gases diffusing into liquids. It is the same equation used in Procedure 13A1.1. It was developed for use in both gas/liquid and dilute binary liquid systems.

$$D_{1,2} = 5.922 \times 10^{-8} \frac{T \bar{R}_2}{\mu \bar{R}_1} \quad (13C.1-1)$$

Where:

- $D_{1,2}$  = diffusion coefficient of solute (component 1) in solvent (component 2) in ft<sup>2</sup>/hr
- $T$  = temperature in degrees Rankine
- $\mu$  = viscosity of solution (considered as pure solvent) in centipoise
- $\bar{R}_2$  = radius of gyration of solvent in Angstrom units
- $\bar{R}_1$  = radius of gyration of solute in Angstrom units

**Procedure**

Step 1: Obtain  $\bar{R}_1$  and  $\bar{R}_2$  from Table 13A1.2. In the absence of experimental data, estimate  $\mu$  using the procedures of Chapter 11.

Step 2: Calculate  $D_{1,2}$  from equation (13C.1-1).

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