

Estimate the specific volume of isobutane

case 1- saturated liquid at 310.93 K

case 2- compressed liquid at 310.93 K and 137.9 bar

**Solution:**

|               |                                    |
|---------------|------------------------------------|
| Fluid name    | isobutane                          |
| Fluid index   | 274                                |
| Tc in Kelvin  | 408.1 K                            |
| Pc            | 36.5 bar                           |
| T             | 310.93 K                           |
| P             | 137.9 bar                          |
| Pr            | 3.78                               |
| Acentric Fac. | 0.176                              |
| Tr            | 0.76                               |
| R             | 83.14 cm <sup>3</sup> .bar/(mol.K) |

Table look up from file:  
"Chemical component properties.xls"  
Index 274

|                               |           |
|-------------------------------|-----------|
| P <sub>sat</sub> (reduced)    | 0.139353  |
| P <sub>sat</sub>              | 5.086 bar |
| P <sub>sat</sub> experimental | 4.958 bar |
| Error                         | 2.6%      |

|                                   |                            |
|-----------------------------------|----------------------------|
| Z(T <sub>sat</sub> )              | 0.021138                   |
| V(T <sub>sat</sub> )              | 107.4 cm <sup>3</sup> /mol |
| V(T <sub>sat</sub> ) experimental | 108.2 cm <sup>3</sup> /mol |
| Error                             | -0.7%                      |

|                     |                            |
|---------------------|----------------------------|
| Z(P,T)              | 0.556481                   |
| V(P,T)              | 104.3 cm <sup>3</sup> /mol |
| V(P,T) experimental | 102.7 cm <sup>3</sup> /mol |
| Error               | 1.6%                       |

|   |          |                                      |           |
|---|----------|--------------------------------------|-----------|
| Temperature range for Lee-Kesler method |          | Pressure range for Lee-Kesler method |           |
| Tmin                                    | 122.43 K | Pmin                                 | 0.365 bar |
| Tmax                                    | 1632.4 K | Pmax                                 | 365 bar   |

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