

Appendix D

Data for various fluids

Data extracted from Physical and Thermodynamic Properties of Pure Chemicals:
Evaluated Process Design Data (Taylor & Francis 1999)

Normal boiling point is defined as the boiling point at one atmosphere of pressure.
All other quantities are as defined in the text.

Air

$M=28.951$ g/mole
Normal boiling point= 78.67 K

Critical Data:

$P_{cr}=3.774$ MPa $T_{cr}=132.45$ K $\bar{V}_{cr}=0.09147$ m³/kmole

Triple Point Data:

$P_{TP}=5.642$ kPa $T_{TP}=59.15$ K

Data at 300K:

$\bar{C}_p=29.00$ J/mole·K $\bar{C}_v=20.68$ J/mole·K
 $\gamma=1.402$ $k=0.0261$ W/m·K

Ar (Argon)

$M=39.948$ g/mole
Normal boiling point= 87.28 K

Critical Data:

$P_{cr}=4.898$ MPa $T_{cr}=150.86$ K $\bar{V}_{cr}=0.07459$ m³/kmole

Triple Point Data:

$P_{TP}=68.800$ kPa $T_{TP}=83.78$ K

Data at 300K:

$\bar{C}_p=20.79$ J/mole·K $\bar{C}_v=12.47$ J/mole·K
 $\gamma=1.667$ $k=0.0179$ W/m·K

CO (Carbon Monoxide)

M=28.010 g/mole

Normal boiling point=81.70K

Critical Data:

$P_{cr}=3.4988$ MPa $T_{cr}=132.92$ K $\bar{V}_{cr}=0.09310$ m³/kmole

Triple Point Data:

$P_{TP}=15.206$ kPa $T_{TP}=68.15$ K

Data at 300K:

$\bar{C}_p=29.14$ J/mole·K $\bar{C}_v=20.83$ J/mole·K
 $\gamma=1.399$ $k=0.0252$ W/m·K

CO₂ (Carbon Dioxide)

M=44.010 g/mole

Normal boiling point: Liquid phase does not exist at 1 atm.

Critical Data:

$P_{cr}=7.3815$ MPa $T_{cr}=304.19$ K $\bar{V}_{cr}=0.09400$ m³/kmole

Triple Point Data:

$P_{TP}=513.51$ kPa $T_{TP}=216.58$ K

Data for vapor at 300K:

$\bar{C}_p=37.34$ J/mole·K $\bar{C}_v=29.02$ J/mole·K
 $\gamma=1.286$ $k=0.0166$ W/m·K

CF₃CH₂F (R-134a)

M=102.031 g/mole

Normal boiling point=247.08 K

Critical Data:

 $P_{cr}=4.0560$ MPa $T_{cr}=374.18$ K $\bar{V}_{cr}=0.1988$ m³/kmole

Triple Point Data:

 $P_{TP}=0.399397$ kPa $T_{TP}=169.85$ K

Data for vapor at 300K:

 $\bar{C}_p=85.58$ J/mole·K $\bar{C}_v=77.27$ J/mole·K $\gamma=1.108$ $k=0.0133$ W/m·K**H₂O (Water)**

M=18.015 g/mole

Normal boiling point=373.15 K

Critical Data:

 $P_{cr}=22.055$ MPa $T_{cr}=647.13$ K $\bar{V}_{cr}=0.05595$ m³/kmole

Triple Point Data:

 $P_{TP}=0.61173$ kPa $T_{TP}=273.16$ K (exactly)

Data for vapor at 300K:

 $\bar{C}_p=33.59$ J/mole·K $\bar{C}_v=25.27$ J/mole·K $\gamma=1.329$ $k=0.0188$ W/m·K

He (⁴He)

M=4.003 g/mole
Normal boiling point=4.22 K

Critical Data:

$P_{cr}=0.22750$ MPa $T_{cr}=5.20$ K $\bar{V}_{cr}=0.05730$ m³/kmole

Triple Point Data:

$P_{TP}=1.4782$ kPa $T_{TP}=1.76$ K

Data for vapor at 300K:

$\bar{C}_p=20.79$ J/mole·K $\bar{C}_v=12.47$ J/mole·K
 $\gamma=1.667$ $k=0.1545$ W/m·K

NH₃ (Ammonia)

M=17.0306 g/mole
Normal boiling point=239.72 K

Critical Data:

$P_{cr}=11.280$ MPa $T_{cr}=405.65$ K $\bar{V}_{cr}=0.07247$ m³/kmole

Triple Point Data:

$P_{TP}=6.1111$ kPa $T_{TP}=195.41$ K

Data for vapor at 300K:

$\bar{C}_p=35.61$ J/mole·K $\bar{C}_v=27.29$ J/mole·K
 $\gamma=1.305$ $k=0.0251$ W/m·K

N₂

M=28.0135 g/mole
Normal boiling point=77.344 K

Critical Data:

P_{cr}=3.4000 MPa T_{cr}=126.2 K \bar{V}_{cr} =0.08921 m³/kmole

Triple Point Data:

P_{TP}=12.520 kPa T_{TP}=63.149 K

Data for vapor at 300K:

\bar{C}_p =29.13 J/mole·K \bar{C}_v =20.81 J/mole·K
 γ =1.399 k=0.0256 W/m·K

Ne

M=20.1797 g/mole
Normal boiling point=27.09 K

Critical Data:

P_{cr}=2.6530 MPa T_{cr}=44.4 K \bar{V}_{cr} =0.0417 m³/kmole

Triple Point Data:

P_{TP}=43.300 kPa T_{TP}=24.56 K

Data for vapor at 300K:

\bar{C}_p =20.79 J/mole·K \bar{C}_v =12.47 J/mole·K
 γ =1.667 k=0.0490 W/m·K

O₂

M=31.9988 g/mole

Normal boiling point=90.188 K

Critical Data:

P_{cr}=5.0430 MPa

T_{cr}=154.58 K

\bar{V}_{cr} =0.0734 m³/kmole

Triple Point Data:

P_{TP}=0.1500 kPa

T_{TP}=54.361 K

Data for vapor at 300K:

\bar{c}_p =29.36 J/mole·K \bar{c}_v =21.04 J/mole·K

γ =1.395

k=0.0266 W/m·K

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8/10/04

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