

## Z-FACTOR FOR HP PRIME

Version 1.0 – March 2020.

**Type:** Thermodynamics Program

**Description:** Given temperature, pressure and critical properties for a pure substance (gas or saturated condition); **Z-Factor** calculates: compressibility factor “z”, volume, fugacity, and residual properties.

**Method:**

Thermodynamic properties are calculated using “Peng-Robinson” or “Redlich-Kwong” method.

If accentric factor “ $\omega$ ” is indicated, Peng Robinson EOS is used, if not ( $\omega=0$ ) then Redlich Kwong EOS is used.

If Molar Weight “MW” is indicated, physical and thermodynamic properties are calculated using mass base, if not (MW=0) then properties are calculated mol base.

Results can be obtained under SI or IP system.

**Example:**

**Input:** Using water properties

The screenshot shows a software window titled "REAL GAS PROPERTIES" with a status bar at the top right displaying "23:19". The interface contains several input fields and units:

- T: 100 °C (with a dropdown arrow)
- P: 1 atm (with a dropdown arrow)
- Tc: 647.1 °K (with a dropdown arrow)
- Pc: 220.55 bar (with a dropdown arrow)
- \*MW: 18.015 kg/kmol (with a dropdown arrow)
- \* $\omega$ : 0.345
- SI Units: ☒

At the bottom left, the text "Real Temperature" is displayed. At the bottom right, there are buttons for "Edit", "Cancel", and "OK".

**Output:** Results obtained ...

```
Terminal 23:20
THERMODYNAMIC PROPERTIES FOR PURE SUSTANCE
CONDITIONS:
T(°K): 373.15
P(Pa): 101325
Tc(°K): 647.1
Pc(Pa): 2205000
w(-): 0.345
SATURATED LIQUID
Z(-): 0.0007
V(m³/kg): 0.0012
SATURATED GAS
Z(-): 0.9913
V(m³/kg): 1.6849
RESIDUAL PROPERTIES (GAS)
h(J/kg): -3987.09
s(J/kg·°K): -6.68
f(-): 0.9914
REAL GAS PROPERTIES v1.0 - MARCH 2020 BY JESUS TAMEZ
```

**Author:**

[Jesús A. Tamez García](#), ChEng, MSc, MBA.

[jesus.tamez@udem.edu](mailto:jesus.tamez@udem.edu)

Monterrey, MX.

*.... I hope you find it useful !!!*