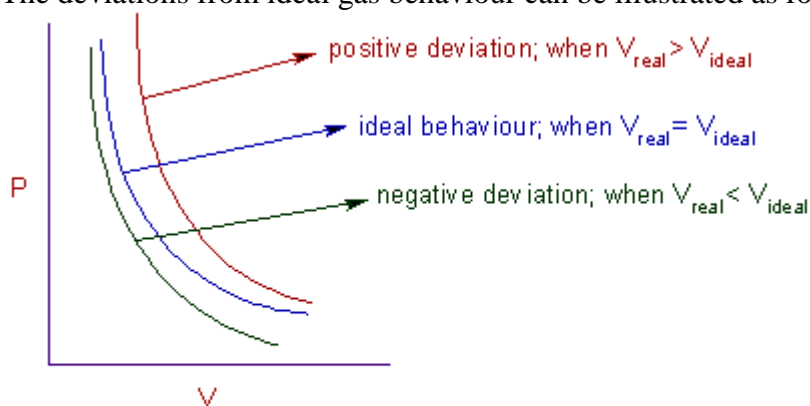


Real gases do not obey ideal gas equation under all conditions. They nearly obey ideal gas equation at higher temperatures and very low pressures. However they show deviations from ideality at low temperatures and high pressures.

The deviations from ideal gas behaviour can be illustrated as follows:



V_{real} = Volume of the real gas at given pressure.

V_{ideal} = Volume of the gas calculated by ideal gas equation at given pressure.

The isotherms obtained by plotting pressure, P against volume, V for real gases do not coincide with that of ideal gas, as shown below.

It is clear from above graphs that the volume of real gas is more than or less than expected in certain cases. The deviation from ideal gas behaviour can also be expressed by compressibility factor, Z.

Compressibility factor (Z):

The ratio of PV to nRT is known as compressibility factor.

(or)

The ratio of volume of real gas, V_{real} to the ideal volume of that gas, $V_{perfect}$ calculated by ideal gas equation is known as compressibility factor.

$$Z = \frac{PV_{real}}{nRT}$$

But from ideal gas equation:

$$PV_{perfect} = nRT$$

or

$$V_{perfect} = \frac{nRT}{P}$$

Therefore

$$Z = \frac{PV_{real}}{nRT} = \frac{V_{real}}{V_{perfect}}$$

* For ideal or perfect gases, the compressibility factor, $Z = 1$.

* But for real gases, $Z \neq 1$.