# Gas Reservoir Material Balance (p/z)

Original gas in place of a volumetric gas reservoir from initial and current p/z and the gas produced, and the recovery factor reached.

**Method:** Ahmed; Reservoir Engineering Handbook; ...

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Initial reservoir pressure | 3,000.0 | psi |
| Z at initial pressure | 0.85000 | |
| Current reservoir pressure | 2,500.0 | psi |
| Z at current pressure | 0.84000 | |
| Cumulative gas produced (standard) | 2.8317e+08 | m³ |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Initial p/z | 3,529.4 | psi |
| Current p/z | 2,976.2 | psi |
| Original gas in place (standard) | 1.8065e+09 | m³ |
| Recovery to date | 15.675 | % |

**Notes for this case**

• Volumetric (no water influx) reservoir: p/z falls on a straight line against G_p and reaches zero at G. Water drive keeps p/z higher and makes this G too large; plot several points to check the line.

## Formula and method

$$\frac{p}{z} = \frac{p_i}{z_i}\left(1 - \frac{G_p}{G}\right) \Rightarrow G = G_p \frac{p_i/z_i}{p_i/z_i - p/z}$$

### Variables

| | | |
|---|---|---|
| $p_i$ | Initial reservoir pressure | Pa |
| $z_i$ | Z at initial pressure | - |
| $p$ | Current reservoir pressure | Pa |
| $z$ | Z at current pressure | - |
| $G_p$ | Cumulative gas produced (standard) | m³ |
| $p_i/z_i$ | Initial p/z | Pa |
| $p/z$ | Current p/z | Pa |
| $G$ | Original gas in place (standard) | m³ |
| $G_p/G$ | Recovery to date | - |

### Method and standards

Volumetric gas material balance.

### Assumptions and limits

- Volumetric reservoir; no influx.

### References

• Ahmed
• Reservoir Engineering Handbook

- 5th ed. (Gulf Professional Publishing, 2019)
- ch. 13 (gas reservoirs, volumetric material balance)

## Report details

| | |
|---|---|
| Report reference | FCC-YKRG-R2QA (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:50 UTC |
| Calculator | Gas Reservoir Material Balance (p/z) |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 2 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/chemical/oil-gas/gas-material-balance-pz

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.