



# E02 • PVT

An Emeraude interpretation relies on the definition of a PVT model describing the nature of the flowing mixture, and giving the associated PVT properties as a function of T and P. Each property is represented by a user selected Black-Oil correlation, possibly constrained to match some entered measurements. The flowing mixture is defined as a hydrocarbon model with or without water:

Fluid type

Hydrocarbons

Dry Gas

**Saturated Oil (bubble point fluid)**

Condensate (dew point fluid)

Water

For hydrocarbons involving potentially 2 phases, the PVT model does not pre-suppose the existence/presence of a given phase at downhole conditions. This is delayed until the actual rate calculations.

The calculation engine invokes the PVT model dynamically when PVT properties are required, which makes the PVT model an independent and self-contained component of the interpretation. In the data browser, a PVT node appears inside an interpretation (once the PVT model has been defined). This node can be copied from one interpretation to another using drag and drop in the data browser. It can be saved to a file, and loaded from a file.

## E02.1 • Gas PVT

The available correlations for the gas phase are:

| Z factor        | $\mu_g$     | $\rho_g$ |
|-----------------|-------------|----------|
| Dranchuk        | Lee et al.  | Katz     |
| Beggs and Brill | Carr et al. |          |
| Hall-Yarborough |             |          |



### E02.2 • Oil PVT

The available oil phase correlations are:

| Rs, Pb             | Bo                 | $\mu_o$          | Co                 |
|--------------------|--------------------|------------------|--------------------|
| Lasater            | Standing           | Beggs & Robinson | Vasquez & Beggs    |
| Standing           | Vasquez & Beggs    | Beal             | Petrosky & Farshad |
| Vasquez & Beggs    | Glaso              | Glaso (dead oil) |                    |
| Glaso volatile     | Petrosky & Farshad |                  |                    |
| Lasater-Standing   |                    |                  |                    |
| Petrosky & Farshad |                    |                  |                    |

### E02.3 • Water PVT

The water phase correlations are:

| Bw     | Cw                  | Muw                |
|--------|---------------------|--------------------|
| Gould  | Dodson and Standing | Van-Wingen + Frick |
| McCain | Osif                |                    |

A working subset as well as the default for each property can be defined in the Interpretation Settings option. It is possible to constrain the followings with entered match points: Rsw, Cw, Bw,  $\mu_w$ ,  $\rho_w$

### E02.4 • Condensate PVT

The Black-Oil condensate model available in Emeraude uses a parabolic relation for the dissolved condensate as a function of pressure. The relation is set from tank and separator conditions. The required input parameters are:

- Tank gas gravity
- Tank GOR
- Separator gas gravity
- Separator GOR
- Separator P and T
- Dewpoint P and T
- Liquid Gravity
- Sour gas content

The condensate model is based on a special correlation for the vaporized condensate. This correlation is initialized from the knowledge of the dew point conditions, the separator, and the tank conditions. The tank values can be calculated automatically using the method after D.K. Gold, W.D. McCain Jr & J.W. Jennings described in their paper “An improved method for the Determination of the Reservoir-Gas Specific Gravity for Retrograde Gases”, Journal of Petroleum Technology, July 1989.