

## 21. ZADATAK

Izračunati pseudokritične parametre ekvimolarne smjese etana(1), propana(2) i butana(3) prema:

- Kayevom i Prausnitz-Gunnovom pravilu
- Redlich-Kwongovom pravilu

### Podaci:

<b>TVAR</b>	<b><math>T_K/K</math></b>	<b><math>p_K/\text{bar}</math></b>	<b><math>v_K/\text{cm}^3\text{mol}^{-1}</math></b>	<b><math>z_K</math></b>	<b><math>\omega</math></b>
ETAN	305,4	48,8	148,3	0,285	0,099
PROPAN	369,8	42,5	203	0,281	0,153
BUTAN	426,2	38	255	0,274	0,199

# KAY I PRAUSNITZ-GUNN

Pseudokritični parametri

**Kay**

**Prausnitz i Gunn**

$$v_{\text{KM}} = \sum y_i v_{\text{Ki}}$$

$$T_{\text{KM}} = \sum y_i T_{\text{Ki}}$$

$$p_{\text{KM}} = \sum y_i p_{\text{Ki}}$$

$$v_{\text{KM}} = \sum y_i v_{\text{Ki}}$$

$$T_{\text{KM}} = \sum y_i T_{\text{Ki}}$$

$$z_{\text{KM}} = \sum y_i z_{\text{Ki}}$$

$$p_{\text{KM}} = \frac{z_{\text{KM}} RT_{\text{KM}}}{v_{\text{KM}}}$$

$$\omega = \sum y_i \omega_i$$

## REZULTAT:

$$T_{\text{KM}} = 366,4 \text{ K}$$

$$z_{\text{KM}} = 0,2797$$

$$v_{\text{KM}} = 2,0189 \cdot 10^{-4} \text{ m}^3 \text{ mol}^{-1}$$

$$p_{\text{KM}} = 4220,82 \text{ kPa}$$

$$\omega_{\text{KM}} = 0,1502$$

# REDLICH-KWONG

Pseudokritični parametri

$$T_{\text{KM}} = \left\{ \frac{\left[ \sum y_i \cdot \sqrt{\frac{T_{\text{Ki}}^{5/2}}{p_{\text{Ki}}}} \right]^2}{\sum y_i \cdot \frac{T_{\text{Ki}}}{p_{\text{Ki}}}} \right\}^{2/3}$$

$$T_{\text{KM}} = \left\{ \frac{\left[ 0,33 \cdot \sqrt{\frac{305,4^{5/2}}{48,8 \cdot 10^5}} + 0,33 \cdot \sqrt{\frac{369,8^{5/2}}{42,5 \cdot 10^5}} + 0,33 \cdot \sqrt{\frac{426,2^{5/2}}{38,0 \cdot 10^5}} \right]^2}{0,33 \cdot \frac{305,4}{48,8 \cdot 10^5} + 0,33 \cdot \frac{369,8}{42,5 \cdot 10^5} + 0,33 \cdot \frac{426,2}{38,0 \cdot 10^5}} \right\}^{2/3}$$

$$T_{\text{KM}} = \left[ \frac{(0,1926 + 0,2622 + 0,3311)^2}{2,086 \cdot 10^{-5} + 2,900 \cdot 10^{-5} + 3,739 \cdot 10^{-5}} \right]^{2/3} = 366 \text{ K}$$

$$p_{\text{KM}} = \frac{T_{\text{KM}}}{\sum y_i \cdot \frac{T_{\text{Ki}}}{p_{\text{Ki}}}}$$

$$p_{\text{KM}} = 4240,3 \text{ kPa}$$