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We brengen 8,456 g HOAc in een maatkolf van 250,0 mL. De maatkolf wordt verder opgevuld met water. Bereken de pH van deze oplossing?

$$K_{a\text{HOAc}} = 1,8 \cdot 10^{-5}$$

### Oplossing



$$M_{\text{HOAc}} = (2 \times 12,0 + 4 \times 1,0 + 2 \times 16,0) \frac{\text{g}}{\text{mol}} = 60,0 \frac{\text{g}}{\text{mol}}$$

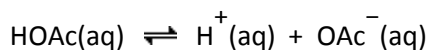
HOAc:

$$8,456 \text{ g} = \frac{8,456 \text{ g}}{60,0 \frac{\text{g}}{\text{mol}}} = 0,141 \text{ mol}$$

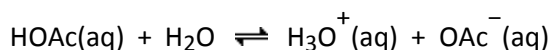
$$\frac{0,141 \text{ mol}}{0,250 \text{ L}} = 0,564 \frac{\text{mol}}{\text{L}}$$

HOAc:

= zwak zuur, weinig geïoniseerd



of



$\frac{\text{mol}}{\text{L}}$	[HOAc]	$[\text{H}^+]$ of $[\text{H}_3\text{O}^+]$	$[\text{OAc}^-]$
Begin	0,564	0	0
$\Delta$	- x	+ x	+ x
Evenwicht	(0,564 - x)	x	x

$$K_{a\text{HOAc}} = \frac{[\text{H}^+][\text{OAc}^-]}{[\text{HOAc}]} = 1,8 \cdot 10^{-5}$$

$$\Rightarrow \frac{x^2}{0,564 - x} = 1,8 \cdot 10^{-5}$$

$$\Rightarrow x^2 + 1,8 \cdot 10^{-5}x - 1,0 \cdot 10^{-5} = 0$$

$\Rightarrow$  Twee oplossingen:  $x = 3,1 \cdot 10^{-3}$  en  $-3,2 \cdot 10^{-3}$  (negatieve oplossing chemisch onmogelijk)

$\frac{\text{mol}}{\text{L}}$	[HOAc]	$[\text{H}^+]$ of $[\text{H}_3\text{O}^+]$	$[\text{OAc}^-]$
Evenwicht	0,561	$3,1 \cdot 10^{-3}$	$3,1 \cdot 10^{-3}$

$$\Rightarrow \text{pH} = -\log 3,1 \cdot 10^{-3} = \mathbf{2,51}$$