

PRS Questions: February 8, 2006

Unit conversion and working with equations II

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Unit analysis

- Given the equation at right, what are the units of x?
 - 1) g
 - 2) L
 - 3) mol/g
 - 4) mol/L
 - 5) g/mol

$$x(3.65 \text{ g L}^{-1}) = (4.3 \text{ mol L}^{-1})$$

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$$\frac{x(3.65 \text{ g L}^{-1})}{(3.65 \text{ g L}^{-1})} = \frac{(4.3 \text{ mol L}^{-1})}{(3.65 \text{ g L}^{-1})}$$

$$x = \frac{(4.3 \text{ mol } \cancel{\text{L}^{-1}})}{(3.65 \text{ g } \cancel{\text{L}^{-1}})}$$



Unit analysis

$$x(25.0 \mu\text{mol L}^{-1}) = (5.0 \text{ ng L}^{-1})$$

- Given the equation above, what is the value of x in units of g mol^{-1} ?
 - 1) $2.0 \times 10^3 \text{ g mol}^{-1}$
 - 2) $2.0 \times 10^2 \text{ g mol}^{-1}$
 - 3) $2.0 \times 10^{-3} \text{ g mol}^{-1}$
 - 4) $2.0 \times 10^{-4} \text{ g mol}^{-1}$
 - 5) $2.0 \times 10^{-6} \text{ g mol}^{-1}$

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- 5) $2.0 \times 10^{-6} \text{ g mol}^{-1}$

$$x = \frac{(5.0 \text{ ng L}^{-1})}{(25.0 \mu\text{mol L}^{-1})}$$

$$x = \frac{(5.0 \text{ ng L}^{-1})}{(25.0 \mu\text{mol L}^{-1})} \left(\frac{\mu\text{mol}}{10^{-6} \text{ mol}} \right) \left(\frac{10^{-9} \text{ g}}{\text{ng}} \right)$$

Remember:

$$1 \mu\text{mol} = 10^{-6} \text{ mol}$$

$$1 \text{ ng} = 10^{-9} \text{ g}$$

$$x = 0.2 \times 10^{-3} \text{ g mol}^{-1}$$

$$x = 2.0 \times 10^{-4} \text{ g mol}^{-1}$$



Unit analysis

- Given the equation at right, what are the units of x?
 - 1) L
 - 2) atm
 - 3) mol
 - 4) K
 - 5) mol L⁻¹

$$x = \frac{(3.5 \text{ mol})(0.082 \text{ L atm mol}^{-1} \text{ K}^{-1})(298 \text{ K})}{(4.2 \text{ L})}$$

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