Package ‘gunit’

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Type Package

Title Converts Conductance Units

Version 1.0.2

Description For plant physiologists, converts conductance (e.g. stomatal conductance) to different units: m/s, mol/m^2/s, and umol/m^2/s/Pa.

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Encoding UTF-8

Suggests testthat

RoxygenNote 7.2.1

Imports magrittr (>= 1.5), methods (>= 4.0.0), stringr (>= 1.4.0), units (>= 0.6.0), tibble (>= 2.1.1)

URL https://github.com/cdmuir/gunit

BugReports https://github.com/cdmuir/gunit/issues

NeedsCompilation no

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Convert conductance units

Description

Convert conductance units

Usage

convert_conductance(
  .g,
  P = set_units(101.3246, kPa),
  R = set_units(8.31446, J/K/mol),
  Temp = set_units(298.15, K)
)

Arguments

- .g  Conductance in class units. Units must convertible to one of "m/s", "umol/m^2/s/Pa", or "mol/m^2/s"
- P  A pressure value of class units that is convertible to kPa. Default is 101.3246 kPa, Earth’s atmospheric pressure at sea level.
- R  Ideal gas constant of class units that is convertible to J/K/kg. Default is 8.31446 J/K/mol.
- Temp  A temperature value of class units that is convertible to K. Default is 25 degreeC (298.15 K).

Value

@return a tibble in units "m/s", "umol/m^2/s/Pa", and "mol/m^2/s".

Examples

# library(gunit)
library(units)

g_sc <- set_units(10, "m/s")
convert_conductance(g_sc)

g_sc <- set_units(4, "umol/m^2/s/Pa")
convert_conductance(g_sc)

g_sc <- set_units(0.4, "mol/m^2/s")
convert_conductance(g_sc)
## gunit

### Description

Convert Conductance Units

### Details

See the README on GitHub

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## gw2gc

Convert \( g_c \) (\( \mu \text{mol CO}_2/\text{m}^2/\text{s}/\text{Pa} \)) to \( g_w \) (\( \mu \text{mol H}_2\text{O}/\text{m}^2/\text{s}/\text{Pa} \))

### Description

Convert \( g_c \) (\( \mu \text{mol CO}_2/\text{m}^2/\text{s}/\text{Pa} \)) to \( g_w \) (\( \mu \text{mol H}_2\text{O}/\text{m}^2/\text{s}/\text{Pa} \))

### Usage

\[
gw2gc(g_w, D_c, D_w, \text{unitless}, a) \\
gc2gw(g_c, D_c, D_w, \text{unitless}, a)
\]

### Arguments

- \( g_w \): conductance to water vapor in units (\( \mu \text{mol H}_2\text{O}/(\text{m}^2\text{s}\text{Pa}) \)) of class units.
- \( D_c \): diffusion coefficient for CO2 in air in units of \( \text{m}^2/\text{s} \) of class units.
- \( D_w \): diffusion coefficient for H2O in air in units of \( \text{m}^2/\text{s} \) of class units.
- \( \text{unitless} \): Logical. Should scientific units of arguments be checked and set? TRUE is safer, but slower. If FALSE, values provided are assumed to be in correct units.
- \( a \): exponent used for conversion. Use 1 for still air; 0.67 for laminar flow (Jones 2014). Should be unitless.
- \( g_c \): conductance to CO2 in units (\( \mu \text{mol H}_2\text{O}/(\text{m}^2\text{s}\text{Pa}) \)) of class units.

### Details

Diffusive conductance to CO2 is greater than that of H2O because of the higher molecular weight. To convert:

\[
g_c = g_w (D_c/D_w)^a \\
g_w = g_c (D_w/D_c)^a
\]
Value

Value with units $\mu$mol / (m$^2$ s Pa) of class units.

Note

This function will soon be moving to the standalone gunit package.

References


Examples

library(units)
D_c = set_units(1.29e-05, "m^2/s")
D_w = set_units(2.12e-05, "m^2/s")
g_c = set_units(3, "umol/m^2/s/Pa")
a = 1
g_w = gc2gw(g_c, D_c, D_w, a, unitless = FALSE)
g_w

gw2gc(g_w, D_c, D_w, a, unitless = FALSE)
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