Package ‘hydrogeo’

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Copyright Myles English <myles@rockhead.biz>
Description Contains one function for drawing Piper diagrams (also
called Piper-Hill diagrams) of water analyses for major ions.
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Description

Contains one function, for drawing Piper (or Piper-Hill) diagrams from water analyses for major ions, and a dataset from Zaporozec

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Author(s)

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See Also

piper and toPercent zaporozec

Examples

```r
library(hydrogeo)
data(zaporozec)
zaporozec$CO3 <- rep(0,9) # toPercent expects CO3
zaporozec$Na  <- rep(0,9) # toPercent expects Na
z <- toPercent(zaporozec)
 pz <- piper(z)
 plot(pz,cex=1.5)
```

Description

Create a new piper object
Usage

piper(d, ...)

Arguments

d list passed to class piper, piper

See Also

piper-class and toPercent

piper-class  Class piper

Description

Objects of this class are plotable as Piper-Hill diagrams. A dataframe of major ions as percentages can be used to initialise a piper object.

Usage

## S4 method for signature 'piper'
initialize(.Object, l, ..., call = NULL, pt.col = NULL)

## S4 method for signature 'piperplot'
labelAxes(x, cex.axis = 0.35, side = -1, ...)

## S4 method for signature 'piper'
plot(x, type = "p", cex = 0.75, ...)

## S4 method for signature 'piper'
show(object)

Arguments

.Object object of class piper
l list of data, see 'Examples' below
... additional arguments, as for piper
call the call that asked for the new piper object
pt.col Object of class vector of colours for points
x an object of class piperplot
cex.axis magnification to be used for axis annotation relative to the current setting of 'cex', see help("par")
side integer between 1 and 10 specifying which side to label, the default is to label all

type what type of plot should be drawn, only "p" for *p*oints is useful

cex magnification to be used for symbols relative to the current setting of 'cex', see help("par")

object an object of class piper

Methods (by generic)

• initialize: Initialise
• labelAxes: Label the axes
• plot: Plot an object of class piper
• show: Show an object of class piper

Slots

Ca Object of class vector — Calcium
Mg Object of class vector — Magnesium
Cl Object of class vector — Chloride
SO4 Object of class vector — Sulphate
anion.x x coordinate of the point on the anion triangle (internal)
anion.y y coordinate of the point on the anion triangle (internal)
cation.x x coordinate of the point on the cation triangle (internal)
cation.y y coordinate of the point on the cation triangle (internal)
diamond.x x coordinate of the point on the diamond (internal)
diamond.y y coordinate of the point on the anion diamond (internal)
IDs Object of class vector of sample identifiers
pt.col Object of class vector of colours for points
pt.pch Object of class vector of symbols for points
call Object of class character — call that created it

Author(s)

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References

Examples

```r
showClass("piper")

l <- list( Ca = c(43,10,73,26,32),
          Mg = c(30,50,3,14,12),
          Cl = c(24,10,12,30,43),
          SO4 = c(24,10,12,30,43))

lp <- piper(l)
plot( lp, main="Piper-Hill Diagram of Water Quality" )

# change symbols and colours to differentiate water type groups
lp@pt.pch = c(2,2,4,4,4)
lp@pt.col = c(0,1,0,1,2)

# use larger symbols
plot( lp, main="Piper-Hill Diagram of Water Quality", cex=1.4 )
```

---

**piperPaper**  
*Create a new piperplot object*

**Description**

Create a new piperplot object

**Usage**

```r
piperPaper(size = NULL, ...)
```

**Arguments**

- `size`  
  integer related to the size of the plot area
- `...`  
  additional arguments, as for `piperplot`

**Examples**

```r
library(hydrogeo)
p = piperPaper(size=1)
plot(p)
```
piperplot-class  

Class piperplot

Description

Objects of this class are plottable as empty (i.e. no points) Piper-Hill diagrams

Usage

```r
## S4 method for signature 'piperplot'
Axis(x = NULL)
```

Arguments

- `x`: an object of class piperplot

Methods (by generic)

- `Axis`: Add axes to a piperplot

Slots

- `size`: Object of class numeric — Length of the (square) plot area, defaults to 300
- `call`: R call that created it

plot,piperplot-method  

Plot the diagram area with two triangles and a diamond

Description

Plot the diagram area with two triangles and a diamond

Usage

```r
## S4 method for signature 'piperplot'
plot(x, axes = TRUE, ...)
```

Arguments

- `x`: object of class piperplot
- `axes`: logical saying whether to draw the axes or not, defaults to TRUE
- `...`: further arguments to plot.default
testData

Major ions as a percentage of total major ions - Test Data

Description

Major ions as a percentage of total major ions - Test Data

Usage

testData(n)

Arguments

n Number of test samples to be generated.

Examples

library(hydrogeo)
lp <- piper( testData(26) )

toPercent

Major ions as a percentage of total major ions

Description

Expects certain column names

Usage

toPercent(d)

Arguments

d list or data.frame with the following columns: Ca, Mg, Na, K and Cl, SO4, CO3, HCO3

Examples

library(hydrogeo)
l <- list( Ca = c(43,10,73,26,32),
           Mg = c(30,50,83,14,62),
           Na = c(54,76,3,14,12),
           K = c(31,22,32,22,11),
           Cl = c(24,10,12,30,43),
           SO4 = c(24,10,12,30,43),
           CO3 = c(24,10,12,30,43),
           HCO3 = c(42,110,12,3,4),
        )
```r
IDs = c("A", "B", "C", "D", "E")
d <- toPercent(l)
# check, should add up to 100%
z <- as.data.frame(d)
for(i in 1:length(z[1])) { print(sum(z[i,5:8])) }
for(i in 1:length(z[1])) { print(sum(z[i,1:4])) }
```

**zaporozec**

*Major ions for groundwaters reported by Zaporozec*

**Description**

This data set contains major ion analyses for three groundwaters.

**Format**

A data frame with 9 observations on the following 15 variables:

- **location** a factor with levels Tertiary, Czechoslovakia Upper Cambrian, Wisconsin Upper Cretaceous, Czechoslovakia
- **K** a numeric vector - potassium
- **Mg** a numeric vector - magnesium
- **Ca** a numeric vector - calcium
- **Mn** a numeric vector - magnesium
- **Fe** a numeric vector - iron
- **Cl** a numeric vector - chloride
- **NO3** a numeric vector - nitrate
- **HCO3** a numeric vector - bicarbonate
- **SO4** a numeric vector - sulphate
- **sigma** a numeric vector - standard deviation
- **TDS** a numeric vector - total dissolved solids
- **tempC** a numeric vector - temperature
- **pH** a numeric vector - pH
- **units** a factor with levels meq/l meq_pc mg/l

**Source**


**Examples**

```r
data(zaporozec)
str(zaporozec)
```
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