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ASSESSMENT OF GROUNDWATER CHEMISTRY IN WATES COASTAL AQUIFER, KULON PROGO, YOGYAKARTA SPECIAL PROVINCE, INDONESIA
Phyu Phyu Thin, Dr. Ir. Heru Hendrayana; Dr. Wahyu Wilopo.
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LIST OF ABBREVIATIONS

General Abbreviation	Description
A-CN	- Aluminium oxide - calcium oxide + sodium oxide
A-CN-K	- Aluminium oxide - calcium oxide + sodium oxide potassium oxide
A-CNK-FM	- Aluminium oxide - calcium oxide + sodium oxide + potassium oxide - iron oxide + magnesium oxide
A-CNK	- Aluminium oxide - calcium oxide + sodium oxide + potassium oxide
A-K	- Aluminium oxide - potassium oxide
ArcMap	- Program to create, edit and analyze the geospatial data
B	- Brackish water type
Bs	- Brackish to salt water type
BEX	- Base exchange index
CAI	- Chloro Alkaline Index - an indicator of ion exchange process between groundwater and its host materials
CaO^*	- Calcium in silicate-bearing minerals
CIA	- Chemical index of alteration - a measure of the degree of chemical weathering included potassium
CIW	- Chemical index of weathering - a measure of the degree of chemical weathering without potassium
CEC	- Cation exchange capacity
CaX_2	- Calcium ions adsorbed by clays
C_1	- Cluster one - bicarbonate water type
C_2	- Cluster two - semi-bicarbonate water type
C_3	- Cluster three - brackish to salty water type
C_e	- Concentration of ions at equilibrium
C_i	- Initial concentration of ion
CN	- Calcium oxide plus sodium oxide

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CO_2	- Carbon dioxide
CV	- Coefficient of variation
E	- Sand Dunes and Swales - a geomorphological unit
EC	- Electrical conductivity
et al.,	- And others
etc.	- Usage instead of giving a complete list
F	- Fresh water type
Fb	- Fresh to brackish water type
Fe^{3+}	- Ferric iron
F_m	- Fluviomarine Plain - a geomorphological unit
FM	- Magnesium and iron oxides corner
GPS	- Global Positioning System
H	- Hypersaline water type
h	- Hour for leaching time
H^+	- Hydrogen ion
HCA	- Hierarchical cluster analysis - a statistical technique grouped similar water chemical data
HCl	- Hydrochloric acid
$H_2CO_3^-$	- Carbonic acid
H_2O	- Water
H_3O^+	- Hydronium ion
H_2SO_4	- Sulfuric acid
H_4SiO_4	- Silicic acid - aqueous silica
i.e	- Statement for something in different words
IC	- Ion chromatography
ICP-MS	- Inductively Coupled Plasma Mass Spectrometry
IDW	- Inverse distance weighted
K	- Hydraulic conductivity
LOI	- Loss on ignition
L/S	- Solid to liquid ratio
m	- Mass of adsorbent (soil)
M_1	- Beach - a geomorphological unit

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M_2	- Beach Ridges - a geomorphological unit
Max.	- Maximum
Min.	- Minimum
NaOH	- Sodium hydroxide
NaX	- Sodium ions adsorbed by clays
NH_4	- Ammonium
n, No.	- Numbers
Na_2CO_3	- Sodium carbonate
NE-SW	- North east to south west
O_2	- Oxygen
OH^-	- Hydroxide
pH	- Hydrogen ion concentration
PHREEQC	- pH reaction equilibrium calculation
PIA	- Plagioclase index of alteration
PWI	- Product of weathering index
q_e	- Ion amounts that are adsorbed on soil surface
q_{max}	- Maximum adsorption capacity of ions
r	- Pearson's correlation coefficient
R	- Ruxton chemical weathering index
R^2	- Simple linear regression
R_L	- Equilibrium parameter for Langmuir isotherm
REE	- Rare earth elements
rpm	- Rim per minute
S	- Silica content, Storativity of water within aquifer and Salt water type
SD	- Standard deviation
SI	- Saturation index of mineral
SPSS	- Statistical package for social sciences
STA	- Sampling location number
T	- Temperature and Transmissivity of water through aquifer materials
TDS	- Total dissolved solids

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TH	- Total hardness
V	- Volume of solution and vogt chemical weathering ratio
vs	- Versus
WHO	- World Health Organization
WIP	- Weathering index of parker
XRD	- X-ray Diffractometer
º	- Degree
'	- Minute
"	- Second
Ø	- Phi
/	- Meaning of "or"
θ	- Theta
-	- Minus, dash and no data
+	- Plus

Units Abbreviation	**Description**
℃	- Degree Celsius
g	- Gram
km	- Kilometer
km^2	- Kilometer square
L/g	- Litre per gram
L/mg	- Liter per milligram
m	- Meter
mL	- Milliliter
meq/L	- Milliequivalent per liter
mg/g	- Milligram per gram
mg/L	- Milligram per liter
meq/100 g	- Milliequivalent per 100 grams
ppm	- Parts per million
µm	- Micrometer
Ωm	- Ohm meter
µS/cm	- Microsiemens per centimeter

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%	- Percent
wt.%	- Weight percent
<	- Less than
>	- Greater than
≤	- Less than equal
≥	- Greater than equal
√	- Square root

Major Elements Abbreviation	**Description**
Al_2O_3	- Aluminium oxide
BaO	- Barium oxide
Cr_2O_3	- Chromium (III) oxide
Fe_2O_3	- Ferric oxide (Hematite)
FeO	- Iron oxide
TiO_2	- Titanium dioxide
K_2O	- Potassium oxide
MgO	- Magnesium oxide
MnO	- Manganese Oxide
Na_2O	- Sodium oxide
P_2O_5	- Phosphorus pentoxide
SiO_2	- Silicon dioxide
SrO	- Strontium oxide

Minor Elements Abbreviation	**Description**
Ba	- Barium
Cr	- Chromium
Cs	- Cesium
Ga	- Gallium
Hf	- Hafnium
Nb	- Niobium
Rb	- Rubidium
Sn	- Tin
Sr	- Strontium

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Ta	- Tantalum
Th	- Thorium
U	- Uranium
V	- Vanadium
W	- Tungsten
Zr	- Zirconium

Rare Earth Elements Abbreviation	**Description**
Ce	- Cerium
Dy	- Dysprosium
Er	- Erbium
Eu	- Europium
Gd	- Gadolinium
Ho	- Holmium
La	- Lanthanum
Lu	- Lutetium
Nd	- Neodymium
Pr	- Praseodymium
Sm	- Samarium
Tb	- Terbium
Tm	- Thulium
Y	- Yttrium
Yb	- Ytterbium

Major Ions Abbreviation	**Description**
Al^{3+}	- Aluminium
Br^{-}	- Bromide
Ca^{2+}	- Calcium
Cl^{-}	- Chloride
CO_3^{2-}	- Carbonate
HCO_3^{-}	- Bicarbonate
K^{+}	- Potassium
Mg^{2+}	- Magnesium
Na^{+}	- Sodium
NO_3^{-}	- Nitrate

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PO_4^{3-}	- Phosphate
SO_4^{2-}	- Sulfate

Water Types	**Description**
B4-NaCl (-)	- Brackish extremely hard sodium chloride water with salinization
Ca-Cl	- Calcium - chloride
Ca-HCO_3	- Calcium - bicarbonate
Ca-SO_4	- Calcium - sulphate
$CaNO_3$	- Calcium - nitrate
F1- $(CaHCO_3)_2Ø$	- Fresh moderately hard calcium bicarbonate with no base exchange
F2-$(CaHCO_3)_2Ø$	- Fresh hard calcium bicarbonate with no base exchange
K-NO_3	- Potassium - nitrate
Na-Cl	- Sodium - chloride
Na-Ca-HCO_3	- Sodium - calcium - bicarbonate
Na-HCO_3	- Sodium - bicarbonate
Na-SO_4	- Sodium - sulphate
Na-HCO_3	- Sodium - bicarbonate
Na - Mix	- Sodium - mixed water type
NH_4-SO_4	- Ammonium - sulphate

Chemical Composition of Minerals	**Description**
$Al_2Si_2O_5(OH)_4$	- Kaolinite
$Ca(Al,Mg)_2Si_4O_{10}(OH)_2.n(H_2O)$	- Montmorillonite
$CaAl_2Si_2O_8$	- Anorthite
$(Ca,Na)_2(Mg,Fe.Al)_5(Al,Si)_2O_6$	- Augite
$Ca_2Na(Mg,Fe)_4[(Al,Fe)(Si,Al)_4O_{11}]_2(OH)_2$	- Hornblende
$CaSO_4.2H_2O$	- Gypsum
Fe_2O_3	- Hematite
$NaAlSi_3O_8$	- Albite
NaCl	- Halite
SiO_2	- Quartz

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