Hydroxide, Carbonate and Bicarbonate from P and M Alkalinity

Splits total alkalinity into hydroxide, carbonate and bicarbonate from the phenolphthalein (P) and methyl orange (M) alkalinity titrations, as $CaCO_3$.

Method: APHA; Standard Methods for the Examination of Water and Wastewater; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Phenolphthalein (P) alkalinity, as $CaCO_3$	300.00	mg/L
Total (M, methyl orange) alkalinity, as $CaCO_3$	500.00	mg/L

Calculated results

Parameter	Value	Unit
Hydroxide alkalinity, as $CaCO_3$	100.000	mg/L
Carbonate alkalinity, as $CaCO_3$	400.00	mg/L
Bicarbonate alkalinity, as $CaCO_3$	0	mg/L

Notes for this case

- The standard relations assume no other buffers (phosphate, silicate, ammonia); in treated boiler water they give an approximation.

Formula and method

$$P = 0 : HCO_3 = M \quad 2P < M : CO_3 = 2P,\ HCO_3 = M - 2P \quad 2P = M : CO_3 = M \quad 2P > M : OH = 2P - M,\ CO_3 = 2(M - P) \quad P = M : OH = M$$

Variables

P	phenolphthalein alkalinity as $CaCO_3$	kg/m³
M	total (methyl orange) alkalinity as $CaCO_3$	kg/m³
OH	hydroxide alkalinity	kg/m³
CO_3	carbonate alkalinity	kg/m³
HCO_3	bicarbonate alkalinity	kg/m³

Method and standards

The standard relationships between P and M alkalinity and the hydroxide, carbonate and bicarbonate forms, all as $CaCO_3$.

Assumptions and limits

- Alkalinity from hydroxide, carbonate and bicarbonate only.

References

- APHA
- Standard Methods for the Examination of Water and Wastewater
- method 2320 (alkalinity): relationships of hydroxide
- carbonate and bicarbonate alkalinity from P and M titrations

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/boilers-power-plant/water-treatment/alkalinity-p-m-oh

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.