Buffer pH (Henderson–Hasselbalch)

pH of a buffer from the pKa and the concentrations of the weak acid and its conjugate base, and the base-to-acid ratio for a target pH.

Method: Henderson–Hasselbalch pH = pKa + log([A⁻]/[HA])

Input parameters

Unit system: SI

Parameter	Value	Unit
pKa of the weak acid	4.7600	
Weak acid concentration	0.10000	mol/L
Conjugate base concentration	0.15000	mol/L
Target pH	5.0000	

Calculated results

Parameter	Value	Unit
Buffer pH	4.9361	
Ratio needed for the target pH	1.7378	

Notes for this case

- Valid for buffers well within about one pH unit of the pKa and not too dilute.

Formula and method

$$pH = pK_a + \log_{10}\frac{[A^-]}{[HA]}$$

Variables

pK_a	pKa of the weak acid	-
$[HA]$	Weak acid concentration	mol/m³
$[A^-]$	Conjugate base concentration	mol/m³
pH_t	Target pH	-
pH	Buffer pH	-
$[A^-]/[HA]$	Ratio needed for the target pH	-

Method and standards

Henderson–Hasselbalch.

Assumptions and limits

- Dilute ideal solution. Notes appear when the buffer or target pH is more than one unit from the pKa.

References

- Henderson–Hasselbalch pH = pKa + log([A⁻]/[HA])

Report details

Report reference	FCC-J7BN-QES7 (the same inputs always give the same reference)
Generated	17 November 2026, 19:35 UTC
Calculator	Buffer pH (Henderson–Hasselbalch)
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/chemical/solutions/henderson-hasselbalch-buffer

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.