

Fresh Bunny Battery

What is the pH of the Zn compartment in an alkaline battery?

The pH of the zinc (Zn) compartment in an alkaline battery is **highly alkaline**, typically around **pH 14**. [1, 2, 3, 4, 5]

The electrolyte used in alkaline batteries is primarily a concentrated solution of potassium hydroxide (KOH), which is a strong base. The high concentration of hydroxide ions (OH^-) in the electrolyte makes the entire battery environment, including the zinc anode compartment, strongly basic. [6, 7, 8, 9, 10]

AI responses may include mistakes.

- [1] <https://iopscience.iop.org/article/10.1149/1945-7111/adc6c7>
- [2] https://en.wikipedia.org/wiki/Alkaline_battery
- [3] https://taylorandfrancis.com/knowledge/Engineering_and_technology/Chemical_engineering/Alkaline_batteries/
- [4] <https://www.sciencedirect.com/science/article/pii/B9780444643339000035>
- [5] <https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/cssc.202001216>
- [6] https://en.wikipedia.org/wiki/Alkaline_battery
- [7] <https://byjus.com/chemistry/how-do-alkaline-batteries-work/>
- [8] <https://www.sciencedirect.com/science/article/pii/S2590049821000199>
- [9] <https://nelhydrogen.com/glossary/alkaline-water-electrolysis/>
- [10] <https://corp.tutorocean.com/chemistry/is-koh-potassium-hydroxide-an-acid-or-base/>
- [11] https://en.wikipedia.org/wiki/Alkaline_battery
- [12] <https://pmc.ncbi.nlm.nih.gov/articles/PMC8541016/>
- [13] <https://www.sciencedirect.com/science/article/pii/S2590049821000199>

What is the pH of the MnO_2 compartment of an alkaline battery?

The pH of the (cathode) compartment of a standard alkaline battery is **approximately 14**. The entire battery uses a strongly basic (alkaline) electrolyte, typically a concentrated solution of potassium hydroxide (OH^-). [1, 2, 3, 4]

The basic environment is consistent throughout the cell, and the discharge reactions are balanced in terms of hydroxide ion consumption and production, so the overall pH remains high and stable. [1, 4]

AI responses may include mistakes.

- [1] https://taylorandfrancis.com/knowledge/Engineering_and_technology/Chemical_engineering/Alkaline_battery/
- [2] https://en.wikipedia.org/wiki/Alkaline_battery
- [3] https://taylorandfrancis.com/knowledge/Engineering_and_technology/Chemical_engineering/Alkaline_batteries/
- [4] https://en.wikipedia.org/wiki/Alkaline_battery
- [5] <https://www.quora.com/What-is-the-standard-chemical-composition-of-an-alkaline-battery>
- [6] <https://onlinelibrary.wiley.com/doi/full/10.1002/aenm.202301614>
- [7] <https://pubs.rsc.org/en/content/articlehtml/2013/cs/c3cs60177c>

What is the voltage of the half reaction of Zn to ZnO at pH 14?

Answer:

The voltage (oxidation potential) for this half-reaction at pH 14 is **+1.28 V**. [1]

AI responses may include mistakes.

[1] <https://brainly.com/question/49923857>

What is the voltage of the half reaction of MnO_2 to $\text{MnO}(\text{OH})$ at pH 14?

Answer:

The voltage of the half-reaction at pH 14 is **0.40 V**.

AI responses may include mistakes.

[1] https://en.wikipedia.org/wiki/Manganese_dioxide

[2] <https://allen.in/dn/qna/15880899>

[3] <https://allen.in/dn/qna/644034170>

[4] <https://www.vaia.com/en-us/textbooks/chemistry/chemistry-the-science-in-context-5-edition/chapter-4/problem-102-balance-the-following-half-reactions-by-adding-t/>

[5] <https://www.alevelchemistrytuition.com/single-post/how-to-balance-redox-equations-in-alkaline-and-acid-solutions>

[6] <https://www.khanacademy.org/science/chemistry/oxidation-reduction/cell-potential/v/standard-reduction-potentials>

[7] <https://www.ossila.com/pages/cyclic-voltammetry-applications>

[8] <https://www.vaia.com/en-us/textbooks/chemistry/general-chemistry-the-essential-concepts-5-edition/chapter-19/problem-31-calculate-the-standard-potential-of-the-cell-cons/>

[9] <https://fiveable.me/key-terms/general-chemistry-ii/standard-reduction-potential>

[10] <https://allen.in/dn/qna/644034174>