pH, pOH, and Strong/Weak Behavior

Student Worksheet | g10_u05_w18

I can: calculate and interpret pH/pOH from supplied aqueous concentrations at 25°C, while separating strength from concentration.
Classroom model: At 25°C, use $\text{pH} = -\log[H_3O^+]$, $\text{pOH} = -\log[OH^-]$, and $\text{pH} + \text{pOH} = 14.00$. Brackets mean molar concentration in this introductory model. These relationships are temperature-scoped and do not by themselves establish acid/base strength, safety, or mechanism.

Log scaffold: If $[H_3O^+] = 3.2 \times 10^{-4}$ M, enter '-log(3.2E-4)'; report pH to the decimal-place precision supported by the concentration's significant figures.

Card	given at 25°C	context
A	$[H_3O^+] = 1.0 \times 10^{-3}$ M	aqueous sample
B	$[OH^-] = 2.5 \times 10^{-4}$ M	aqueous sample
C	$[H_3O^+] = 3.2 \times 10^{-4}$ M	aqueous sample
D	same volume: weak acid solution has 0.100 M acid; strong acid solution has 0.0100 M acid	behavior card

1. Define pH in this classroom model.

2. Define pOH in this classroom model.

3. Calculate pH for card A.

4. Calculate pOH for card A.

5. Calculate pOH for card B.

6. Calculate pH for card B.

7. Calculate pH for card C using the log scaffold.

8. Calculate pOH for card C.

9. A sample has pH 5.00. Calculate $[H_3O^+]$.

10. A sample has pOH 3.00. Calculate $[OH^-]$.

11. A sample has pH 2.30. Is it acidic, basic, or neutral in this 25 °C model?

12. Why should $pH + pOH = 14.00$ not be used unchanged at every temperature?

13. Explain why pH is unitless even though the bracketed classroom input is reported in M.

14. In card D, which solution is more concentrated in the stated acid? What does "strong" describe instead?

15. Can a 0.100 M weak acid have a lower pH than a 0.0100 M strong acid? State what information would be needed before deciding.

16. Why does a low pH number not by itself give a complete safety classification?

17. A calculator gives pH 3.49485 from a concentration with two significant figures. How many decimal places should the pH report have?

18. A student says “strong acid means concentrated acid.” Correct the statement.

19. A card is labeled “temperature not reported.” What calculation boundary should you state before using the 14.00 relationship?

20. Write a cautious CER statement using one calculation card and card D; include a numerical result and a strength/concentration limitation.