Neutralization and Titration Data

Student Worksheet | g10_u05_w19

I can: use balanced-equation stoichiometry and supplied titration data to locate an equivalence model and distinguish it from an observed endpoint.
Classroom model: $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$ is 1:1. The analyte card contains 25.00 mL HCl; titrant is 0.1000 M NaOH. An equivalence point is the stoichiometric condition; an endpoint is an indicator/instrument observation that can be near but not identical to it. Data only—no mixing, tasting, or chemical handling.

added NaOH (mL)	0.00	20.00	24.80	25.00	25.20
pH card	1.00	2.30	5.70	7.00	10.30

1. Balance the stated neutralization equation.

2. Identify acid, base, salt, and water in the model.

3. Define equivalence point.

4. Define endpoint.

5. Calculate moles of NaOH at 25.00 mL.

6. At equivalence, how many moles of HCl were initially present?

7. Calculate initial HCl concentration.

8. Why must mL be converted to L in molarity calculations?

9. Which data-card volume is the equivalence model? Cite evidence.

10. Why is pH 7.00 not a universal equivalence criterion?

11. An indicator changes color at 24.80 mL. Is that an endpoint or equivalence point? Explain.

12. Calculate moles NaOH at 24.80 mL.

13. Find the percent difference between 24.80 and 25.00 mL relative to 25.00 mL.

14. What could cause an endpoint to differ slightly from equivalence?

15. A 2:1 reaction model needs 2 mol base per 1 mol acid. How would the mole-ratio equation change?

16. A student says “the curve proves the mechanism.” Correct the claim.

17. State one reason a pH curve is useful even without a live titration.

18. A data card omits titrant concentration. What calculation is blocked?

19. Why does neutralization stoichiometry not by itself classify acid strength?

20. Write a cautious CER statement using one volume/pH card and one stoichiometric calculation.