Acid–Base Models and Evidence

Student Worksheet | g10_u05_w17

I can: compare Arrhenius and Brønsted–Lowry models, identify conjugate pairs, and state what each model does not claim.
Classroom model: Arrhenius acids increase aqueous H_3O^+ and bases increase aqueous OH^-. Brønsted–Lowry acids donate protons and bases accept protons. These are models with scope; acid strength, concentration, rate, and safety are separate claims. All work uses equations and paper data, not chemical handling.

Card	Equation or observation	Stated context
A	$HCl + H_2O \rightarrow H_3O^+ + Cl^-$	aqueous model
B	$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$	aqueous model
C	$HCO_3^- + H_2O \rightleftharpoons CO_3^{2-} + H_3O^+$	proton-transfer model
D	same volume: solution 1 has more dissolved acid particles than solution 2	concentration card

1. Define an Arrhenius acid and base.

2. Define a Brønsted–Lowry acid and base.

3. In card A, identify the Arrhenius acid evidence.

4. In card A, identify the Brønsted–Lowry acid and base.

5. In card B, identify the proton donor and proton acceptor.

6. List the conjugate acid–base pairs in card B.

7. In card C, identify the acid and base.

8. List the conjugate pairs in card C.

9. Why can water be a base in card A but an acid in card B?

10. Why does the Arrhenius model not describe every acid–base process outside aqueous conditions?

11. A student says NH_3 is not a base because it contains no OH^-. Correct the claim using card B.

12. Explain why a proton-transfer equation does not by itself report the reaction rate.

13. Card D has more dissolved acid particles in solution 1. What does this support about concentration? What does it not prove about acid strength?

14. Distinguish strong/weak acid behavior from concentrated/dilute solution language.

15. Identify one safety reason that paper/model analysis is appropriate for acid–base learning.

16. Write an Arrhenius-style statement for the aqueous HCl card.

17. Write a Brønsted–Lowry statement for the NH_3 card.

18. A proposed equation has no transferable proton. Why should you not automatically label it a Brønsted–Lowry acid–base reaction?

19. Compare cards A and B: name one shared feature and one model difference.

20. Write a cautious CER statement using one card, one model classification, and one limitation.