

Atmospheric, Aquatic, and Geochemical Equilibria

g11_u08_w29

Purpose and boundary

Use original fictional system cards only. No environmental sampling, water/air testing, chemical handling, or environmental/health determination is requested.

Targets: I can use a stated equilibrium relation to compare a system card and write a bounded systems claim. **Vocabulary:** reservoir, equilibrium, dissolution, partitioning, boundary, feedback. **Prerequisites:** equilibrium, concentration, pH, system models.

For items 4–12 use the fictional relation $K = [B]/[A] = 4.00$ for $A \rightleftharpoons B$. Cards are paper models under stated conditions.

1. Define a reservoir in a systems-model context.

2. Why can a system boundary change what counts as an input or output?

3. Distinguish equilibrium from equal amounts of every species.

4. If $[A] = 0.50$ M, find model $[B]$ at equilibrium.

5. If $[B] = 1.20$ M, find model $[A]$ at equilibrium.

6. A card has $[A] = 0.40$, $[B] = 0.80$ M. Find Q and compare with K .

7. Based on item 6, state a modeled net direction.

8. Why does that direction not predict a real environmental timescale?

9. A card adds a stated input of A. Name one model tendency and one missing condition.

10. Explain why temperature must be stated before comparing equilibrium constants.

11. A fictional aquatic card has two reservoirs with different listed concentrations. Name one possible transfer-model question.

12. Why is a concentration difference not, by itself, evidence of a source or cause?

13. A card lists pH 6.8 and another 7.2. Find the factor difference in $[H^+]$.

14. Explain why pH difference alone does not establish ecological or health effect.

15. A student says equilibrium means nothing changes. Correct the model statement.

16. Identify one measurement that would help distinguish transfer from local production in a fictional system.

17. A model includes atmospheric and aquatic reservoirs but omits solid material. Name one limit.

18. Write one supported and one unsupported claim from a fictional equilibrium card.

19. Explain why a systems diagram is not a policy or intervention plan.

20. Write a two-sentence bounded conclusion using a reservoir comparison and one limitation.
