

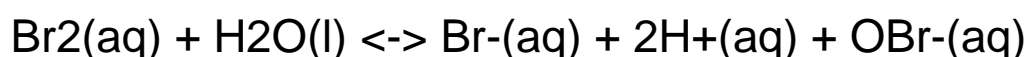
2024 Ch H1 Q23

Section: Chemistry in Society

Topic: Equilibria

Question Summary

Bromine solution is governed by the equilibrium:



Which reagent, when a few drops of a concentrated solution are added, makes the red colour fade? Options: A HCl, B KBr, C AgNO₃, D NaOBr.

Worked Solution

The red colour comes from Br₂(aq). Fading means [Br₂] decreases, so the equilibrium must shift to the right.

Assess each option using Le Chatelier's principle:

- A HCl: adds H⁺ (a product). Adding a product shifts the equilibrium left -> more Br₂, darker colour. Not correct.
- B KBr: adds Br⁻ (a product). Adding a product shifts the equilibrium left -> more Br₂, darker colour. Not correct.
- C AgNO₃: removes Br⁻ by forming a precipitate AgBr(s). Removing a product shifts the equilibrium right to replace Br⁻, consuming Br₂, so the red colour fades. Correct.
- D NaOBr: adds OBr⁻ (a product). Adding a product shifts the equilibrium left -> more Br₂, darker colour. Not correct.

Final Answer C

AgNO_3 (removes Br^- as AgBr , driving the equilibrium to the right and decolourising the solution).

Revision Tips

- Colour cue: $\text{Br}_2(\text{aq})$ is red/orange; Br^- , H^+ , and OBr^- are colourless.
- Adding a product (H^+ , Br^- , OBr^-) shifts left (more Br_2 , deeper colour).
- Removing a product (e.g., precipitating Br^- with Ag^+) shifts right (less Br_2 , fading).
- Common exam trigger: AgNO_3 removes halide as an insoluble $\text{AgX}(\text{s})$, pulling equilibria to the right.