

Solutions

Each answer shows the steps, then the **result**.

2.1

- pK_a

2.2

- About 9

2.3

- Roughly $pK_a \pm 1$

3.1 B

- comparable amounts

3.2

(a)

- Acetic acid

(b)

- Its $pK_a = 4.7$ is closest to the target pH 4.5 (within ± 1), so the acid and base are in comparable amounts and buffer effectively

3.3

- Far from pK_a the ratio $[A^-]/[HA]$ is extreme, so one component is nearly depleted and cannot neutralize added acid or base — buffering fails