

Finding pH after Strong Acid or base is
Added to buffer

- ① Write Acid/Base Reaction of Strong with weak
- ② Fill out ICE (using moles)
- ③ Assess what's left
 - a. weak acid + weak base $\Rightarrow$ use HH
 - b. only weak acid or weak base $\Rightarrow$ see ch. 16
 - c. strong acid + weak acid $\Rightarrow$ use strong acid only
- ④ Assuming buffer capacity was not exceeded,
use "E" values and Henderson-Hasselbalch

General: finding pH after Acid or base is added,
whether to a buffer, a strong acid, a weak
acid, a strong base, or a weak base

- ① Write acid-base reaction
— helps to recognize strong/weak/acid/base/neutral
- ② Calculate Initial Moles

$$\# \text{ moles} = \text{molarity} \times \text{volume (in Liters)}$$
- ③ Use ICE to Determine Final Moles
- ④ Assess situation
- ⑤ Solve pH from there
 — sometimes convert back to molarity
 — Key is Recognizing Final Situation!!

Final Situation + pH Solution

1. Strong Acid only $[H^+] = [SA]$
2. Strong Acid plus weak Acid $[H^+] = [SA]$ ignore WA, which makes insignificant contribution
3. Strong base only $[OH^-] = [SB]$
4. Strong base plus weak base $[OH^-] = [SB]$ ignore WB, which makes insignificant contribution
5. Weak Acid only $[H^+] = \sqrt{K_a \cdot [WA]}$
-qual: $pH < 7$
6. Weak base only $[OH^-] = \sqrt{K_b \cdot [WB]}$ May need to find K_b from K_a of conjugate acid
-qual: $pH > 7$
7. Weak Acid plus weak base $pH = pK_a + \log \frac{WB}{WA}$ Buffer!!
Henderson-Hasselbalch
8. No acids or bases; only neutral salts $pH = 7.0$

Key: Recognizing Final Situation!