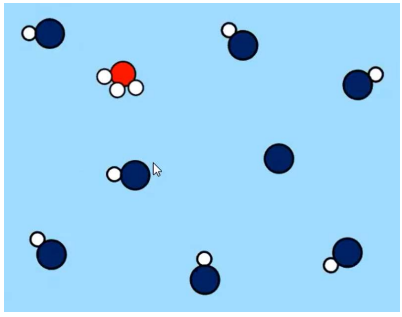
5. pH OF WEAK ACID SOLUTIONS

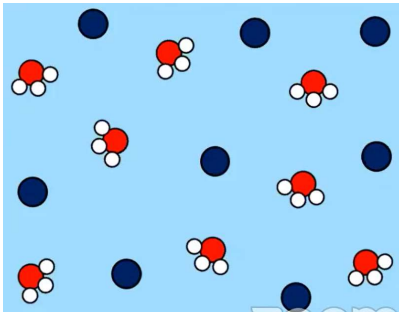
UNIT 4 CH40S WIEBE

1

REVIEW

Which of the following diagrams shows a strong acid dissolved in water? Justify your answer.





2

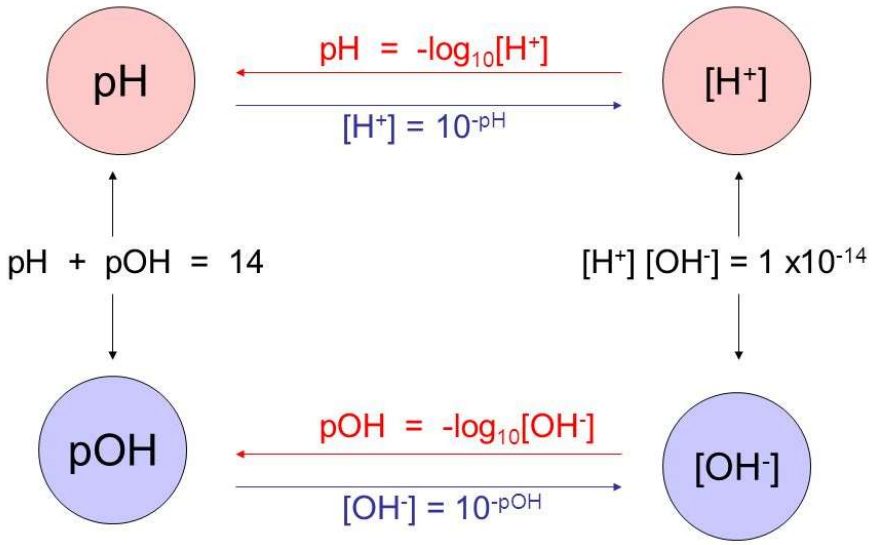
REVIEW

Which of the following acids is a strong acid? Justify your answer.

Concentration (*M*)	pH of Acid 1	ph of Acid 2	ph of Acid 3	pH of Acid 4
0.010	3.44	2.00	2.92	2.20
0.050	3.09	1.30	2.58	1.73
0.10	2.94	1.00	2.42	1.55
0.50	2.69	0.30	2.08	1.16
1.00	2.44	0.00	1.92	0.98

3

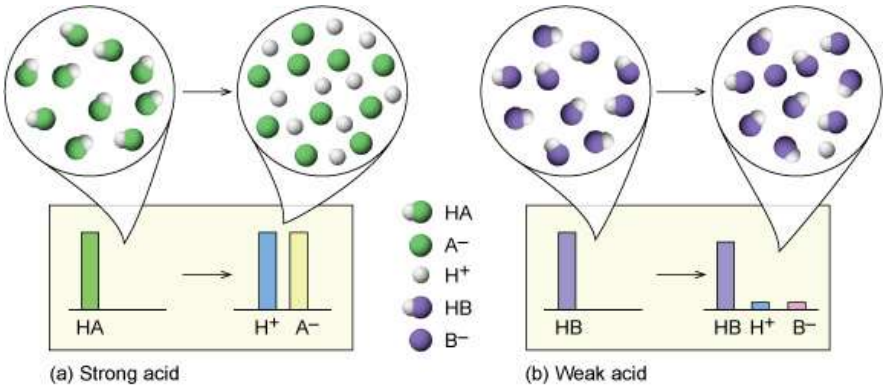
DON'T FORGET…



4

WEAK ACIDS…

- Are reactant favored equilibriums
- Have K_a values to represent equilibrium position
- Require ICE tables to determine $[H_3O^+]$ and pH



5

HAVE A PLAN OF ACTION!

What <u>type of solution</u> am I dealing with?

Acid | *Base*

What <u>type of acid</u> am I dealing with?

Strong | *Weak*

Use **<u>basic stoichiometry</u>** to determine $[H_3O^+]$ and the 4-corners diagram to determine pH/pOH

Use an **<u>ICE table</u>** to determine $[H_3O^+]$ and the 4-corners diagram to determine pH/pOH

What <u>type of base</u> am I dealing with?

Strong | *Weak*

Use **<u>basic stoichiometry</u>** to determine $[OH^-]$ and the 4-corners diagram to determine pH/pOH

Use an **<u>ICE table</u>** to determine $[OH^-]$ and the 4-corners diagram to determine pH/pOH

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FOR EXAMPLE

Hydrofluoric acid is used industrially for etching glass, cleaning metals, and manufacturing electronic parts. Determine the pH and the % ionization of a 0.10 M solution of HF.

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FOR EXAMPLE

Hypochlorous acid is the active sanitizer used in swimming pools. Determine the equilibrium constant (K_a) of a 0.100 M sample of acid if it has a pH of 4.23.

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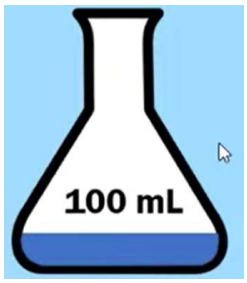
PUTTING IT ALL TOGETHER!

1. Calculate the pH and % ionization of the solution shown.



0.10 M solution of acetic acid (CH_3COOH).

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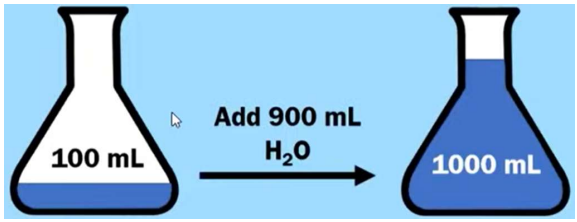
PUTTING IT ALL TOGETHER!

2. Calculate the pH and % ionization of the solution after it has been diluted according to the picture.



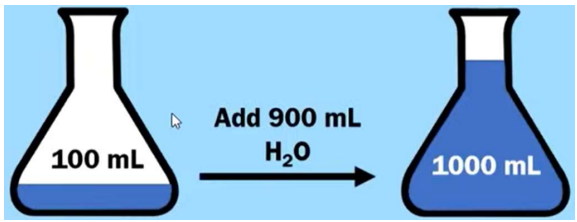
0.10 M solution of acetic acid (CH_3COOH).

??? M solution of acetic acid (CH_3COOH).

10

PUTTING IT ALL TOGETHER – CHALLENGE!

3. What happened to the pH and % ionization of the weak acid when it was diluted?



0.10 M solution of acetic acid (CH_3COOH).

??? M solution of acetic acid (CH_3COOH).

4. Explain why this happens using Le Chatelier's Principle.

$$CH_3COOH + H_2O \leftrightarrow$$

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