PH < 7 : A
PH > 7 : B

Acids and Bases Exam Review

want

given

1) What is the pH of a solution with an $[H^+] = 3.56 \times 10^{-4}$? Is it acidic or basic?

$PH = -\log[H+]$

$= -\log(3.56 \times 10^{-4})$

$PH = 3.44855$

$PH = 3.449$ Acidic

W

given

2) What is the pH of a solution with an $[OH^-] = 6.56 \times 10^{-12}$? Is it acidic or basic?

$POH = -\log[OH^-]$

$= -\log(6.56 \times 10^{-12})$

$POH = 11.183$

$PH + POH = 14$

$PH + 11.183 = 14$

$PH = 2.817$ acidic

3) What is the pH if the pOH is 8.4? Is it acidic or basic?

$pH + pOH = 14$

$pH + 8.4 = 14 \quad -8.4$

$pH = 5.6$

acidic

4) What is the $[H^+]$ if the pH is 5.65? Is it acidic or basic?

$[H^+] = \text{antilog}(-pH)$

$[H^+] = \text{antilog}(-5.65)$

$= 2.23872 \times 10^{-6}$

$[H^+] = 2.2 \times 10^{-6}\ M$, acidic

$PH + POH = 14$ $PH = 9.72$

5) What is the $[OH^-]$ if pOH is 4.28? Is it acidic or basic?

$[OH^-] = \text{antilog}(-POH)$

$= \text{antilog}(-4.28) = 10^{-4.28}$

$[OH^-] = 5.2 \times 10^{-5} M$, basic

6) What is the $[H^+]$ is the pOH is 12.2? Is it acidic or basic?

$PH + POH = 14$

$PH + 12.2 = 14 - 12.2$

$PH = 1.8$

$[H+] = \text{antilog}(-PH)$

$= \text{antilog}(-1.8)$

$[H+] = 0.02 M$, acidic

7) What is the $[H^+]$ is the $[OH^-] = 5.65 \times 10^{-2}$? Is it acidic or basic?

$pOH = -\log[OH^-]$

$= -\log(5.65 \times 10^{-2})$

$pOH = 1.248$

$pH + pOH = 14$

$pH + 1.248 = 14 - 1.248$

$pH = 12.752$

$[H^+] = \text{antilog}(-pH)$

$= \text{antilog}(-12.752)$

$[H^+] = 1.77 \times 10^{-13} M$

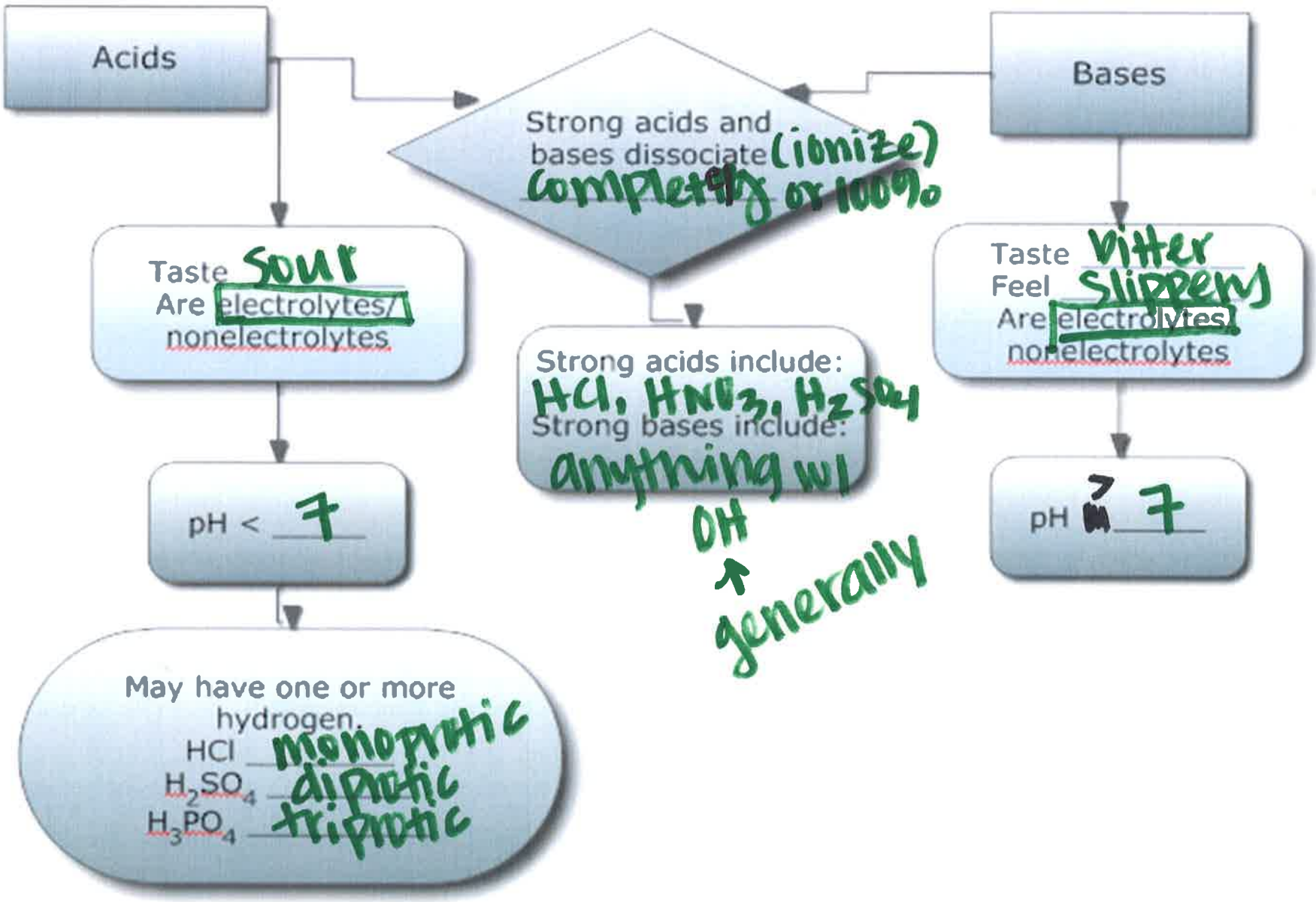
$[H^+][OH^-] = 1.0 \times 10^{-14}$

$[H^+](5.65 \times 10^{-2}) = \frac{1.0 \times 10^{-14}}{5.65 \times 10^{-2}}$

$[H^+] = 1.77 \times 10^{-13} M$

basic

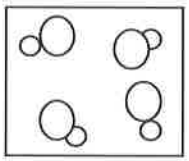
Acids and Bases: A summary

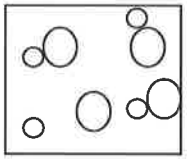


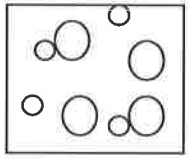
completely

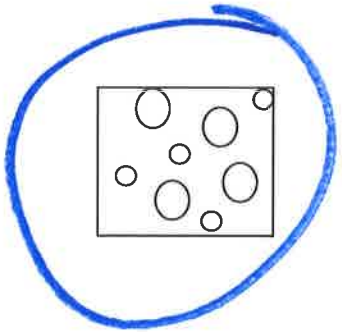
Which picture below correctly describes the behavior of a strong acid? ○ = HF acid

Strong acids completely ionize









Indicators - what color each indicator would turn for the following pH values?

	A	A	B	N	B
pH	4.2	1.9	11.8	7.00	14.0
Phenolphthalein	colorless	colorless	pink	colorless	pink
Bromothymol blue	yellow	yellow	blue	green	blue
Red litmus	red	red	blue	—	blue

Phenol: colorless pink

bromo: yellow green blue

litmus: red blue

Theories of Acids and Bases

Arr. | BL | Lewis
A: H+ | A: lose H+ (CB) | A: accept e-
B: OH- | B: gain H+ (CA) | B: donate e-
(R) (P)

Bronsted – Lowry

Acid: Hydrogen ion donor Base: Hydrogen ion acceptor

Lewis Acids and Bases

Label as Acid, Base, CA, CB

$NH_3 + H_3O^+ \rightarrow H_2O + NH_4^+$

B A CB CA

$HBr + KOH \rightarrow KBr + H_2O$

A B CB CA

← don't worry about this one!

RICE DIAGRAMS

Ka: X = [H+]

A 0.500M solution of a weak acid, HCN, is only partially ionized. The K_a is 6.2×10^{-10} for this acid.

↖ acid

	HCN	→	H^+	+	CN^-
R					
I	0.500		0		0
C	−x		+x		+x
E	0.500−x		x		x

What is the $[H^+]$? 1.8×10^{-5} M

What is the pH? 4.75

What is the pOH? 9.25

$K_a = \frac{[H^+][CN^-]}{[HCN]}$

$6.2 \times 10^{-10} = \frac{(x)(x)}{0.500}$ ##

$\frac{6.2 \times 10^{-10}}{1} = \frac{x^2}{0.500}$

$\sqrt{x^2} = \sqrt{3.1 \times 10^{-10}}$

$x = 1.76\ldots \times 10^{-5} = [H^+]$

$pH = -\log[H^+]$

$= -\log(1.76\ldots \times 10^{-5})$

$pH = 4.75$

$pH + pOH = 14$

$4.75 + pOH = 14$

$pOH = 9.25$

$K_b \cdot x = [OH^-]$

The weak base, NH_3, has a K_b of 1.8×10^{-5}. Calculate the pH of a 0.35 M ammonia solution.

	NH_3	+	H_2O	→	NH_4^+	+	OH^-
R							
I	0.35				0		0
C	−x				+x		+x
E	0.35−x				x		x

$K_b = \frac{[NH_4^+][OH^-]}{[NH_3]}$

$1.8 \times 10^{-5} = \frac{(x)(x)}{0.35}$

$\frac{1.8 \times 10^{-5}}{1} = \frac{x^2}{0.35}$

$\sqrt{x^2} = \sqrt{6.3 \times 10^{-6}}$

$x = 0.0025... = [OH^-]$

$pOH = -\log[OH^-]$

$= -\log(0.0025...) = 2.60$

$pH + pOH = 14$

$pH + 2.60 = 14$

$pH = 11.40$

$[H^+] = \text{antilog}(-pH)$

$= \text{antilog}(-11.4$

$[H^+] = 4.0 \times 10^{-12}$ M

Your review may have this: $[OH^-] = 0.0025$ M

What is the $[H^+]$? 4.0×10^{-12} M

What is the pH? 11.40

What is the pOH? 2.60