

16.4 Estimating the pH of Acid and Base Solutions

pH of a Weak Base – Approx Method

Calculate the pH of a 0.372 M aqueous solution of isoquinoline (C_9H_7N , $K_b = 2.5 \times 10^{-9}$)

a) 5 d) 8
 pH = ? b) 6 (e) 9
 c) 7



	C_9H_7N	+ $H_2O(l)$	=	$C_9H_7NH^+$	+	OH^-
I	0.372			0		0
C	-x			x		x
E	0.372 - x			x		x

$$0.372 > 100(2.5 \times 10^{-9})$$

Thus $0.372 - x \approx 0.372$

$$K_b = \frac{[C_9H_7NH^+][OH^-]}{[C_9H_7N]}$$

$$2.5 \times 10^{-9} = \frac{x \cdot x}{0.372}$$

$$x^2 = 0.372(2.5 \times 10^{-9})$$

$$x = \sqrt{0.372(2.5 \times 10^{-9})}$$

$$= 3.05 \times 10^{-5} = [OH^-]$$

$$pOH = -\log_{10}(3.05 \times 10^{-5}) = 4.52$$

$$pH + pOH = 14 @ 25^\circ C$$

$$pH = 14 - 4.52$$

$$= 9.48$$

16.5 Acid-Base Properties of Salts

Hydrolysis – Neutral Cations and Anions

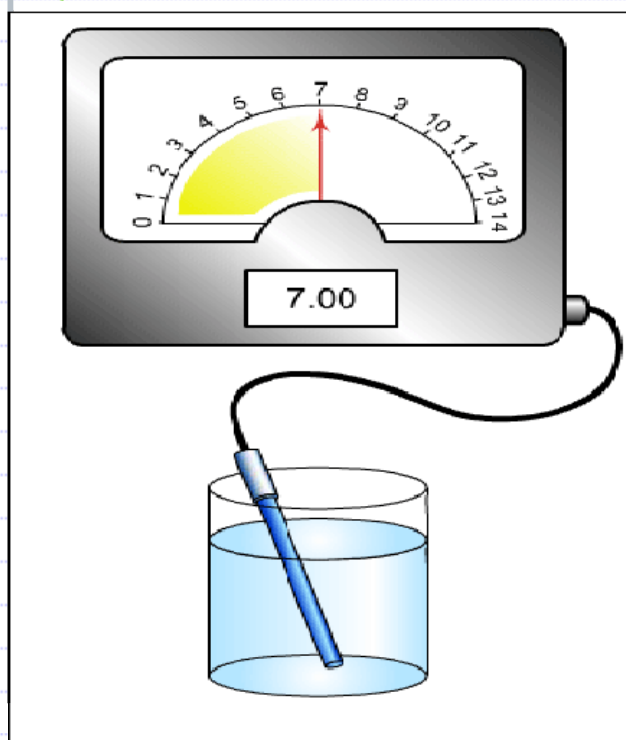
Hydrolysis

Cation	Anion
<input checked="" type="radio"/> Na ⁺	<input checked="" type="radio"/> Cl ⁻
<input type="radio"/> NH ₄ ⁺	<input type="radio"/> F ⁻
<input type="radio"/> C ₅ H ₅ NH ⁺	<input type="radio"/> CN ⁻
	<input type="radio"/> NO ₂ ⁻
	<input type="radio"/> ClO ⁻

Concentration
◀ | ▶
0.01 M

Salt: NaCl
pH = 7.00

See Class Web Site.



NEUTRAL CATIONS

The 6 cations associated with the six strong bases:

Li ⁺	LiOH
Na ⁺	NaOH
K ⁺	KOH
Ca ²⁺	Ca(OH) ₂
Ba ²⁺	Ba(OH) ₂
Sr ²⁺	Sr(OH) ₂

Non neutral cations are all potential weak acids ...ie NH₄⁺

NEUTRAL ANIONS

The 6 anions associated with the six strong acids.

Cl ⁻	HCl
Br ⁻	HBr
I ⁻	HI
NO ₃ ⁻	HNO ₃
SO ₄ ²⁻	H ₂ SO ₄
ClO ₄ ⁻	HClO ₄

Non neutral anions are all potential weak bases ...ie F⁻

16.5 Acid-Base Properties of Salts

Acid-Base Properties of Salts

An aqueous solution of NaClO is expected to be:



- a) Acidic
- b) Basic ✓
- c) Neutral

