

pH / K_a / K_b calculations

What type of substance do you have?

Acid

Base

Salt

weak or strong?

weak or strong?

what are the ions?

calculate $[H^+]$
via ICE chart
using K_a for acid

$$pH = -\log[H_3O^+]$$

$$[H_3O^+] = [\text{acid}]$$

if it is a buffer
(= weak acid plus the salt of
the conjugate base) may
use HH eqn. to
shorten calculation

$$pH = -\log[H_3O^+]$$

calculate $[OH^-]$
via ICE chart
using K_b for base

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

$$[OH^-] = [\text{base}]$$

for monobasic bases (KOH)

$$[OH^-] = 2 \times [\text{base}]$$

for dibasic bases (Ca(OH)₂)

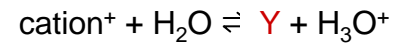
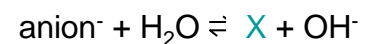
etc.

$$pH = 14 - pOH$$

if it is a buffer
(= weak base plus the salt
of the conjugate acid)
may use HH eqn.
to shorten
calculation

$$pOH = -\log[OH^-]$$
$$pH = 14 - pOH$$

reaction with H₂O?



do X / Y exist?
(is X or Y a weak acid
or base?)

yes

no

OH⁻ / H₃O⁺
are generated
solutions are basic
or acidic

you're done
- solution is
neutral (no
reaction with
water)

you can calculate exact pH of salt solutions via