Re: Stuck on a Biochemistry question

Source: http://sci.tech−archive.net/Archive/sci.chem/2006−04/msg00522.html

- *From*: Jimchip <jimchip@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
- *Date*: Sun, 30 Apr 2006 01:14:08 −0000

On 2006−04−30, raconte@xxxxxxxxxxx <raconte@xxxxxxxxxxx> wrote:

> Jimchip wrote:
>
> > On 2006−04−29, ///Owen\\\ <mo−jo@xxxxxxx> wrote:
> >
> > > Ash wrote:
> > >
> > > > "Jimchip"
> > > > <jimchip@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
> > > > wrote in
> > > > message
> > > > news:1256hendogsal09@xxxxxxxxxxxxxxxxxxxx
> > > >
> > > > > On 2006−04−29, Ash
> > > > > <mail@xxxxxxxx> wrote:
> > > > >
> > > > > > If anyone
> > > > > > out there
> > > > > > has done
> > > > > > this before,
> > > > > > and is bored
> > > > > > enough to
> > > > > > have a look
> > > > > > at it again,
> > > > > > any help
> > > > > > would be
> > > > > > greatly
> > > > > > appreciated
> > > > > > (its the last
> > > > > > question
> > > > > > and i cant
> > > > > > do it :P):
> > > > > >
> > > > > > "A newly
> > > > > > discovered
> > > > > > insect
> > > > > > squirts out

formic acid (Ka = 1.8 x 10−4) as a defensive mechanism. An analysis of this liquid shows the concentration of formate ion to be 0.015M and the total concentration of formate plus formic acid to be 1.45M. What is the pH of this liquid? Hint: pH = pKa + log([A]/[HA])"

Formic acid= HA
Formate = A−

pH = pKa + log([formate])/[formic acid])

−−
Henderson−Hasselbach equation

How come such a simple equation (it's only a rearrangemt of
HA === H+ + A−
and logged) earned two people immortality?

Well, Henderson's work is almost 100 years old (1908). Think about what it was like back then in terms of the quantitative description of matter, chemical bonding theory, and especially acid−base theory. Arrhenius was only

> ~20 years before and Lowry and Bronsted were 15 years later. Hasselbalch's log formulation was ~9 years before Lowry and Bronsted.
>
> Add to that the fact that it is an elegant mathematical description of a rather complex system involving coupled equilibria, that it is a model for the modern analysis of pharmacological "intrinsic activity", and that it is so simple that anyone can use it, or a rearranged version, in very important applications.
>
> −−
> Elegant and profound.
> 'Simple' is a compliment when the subject is deep.

> That, and it does come in handy. If you want to mix up a buffer, and you have the acid and base forms handy, you can just mix the correct ratio, and the pH will be very close. That was probably more important years ago, when pH meters were cranky devices that never seemed to be stable −− or even non−existant.

I could have added above that it is still being used 100 years later because no one has improved on it.

Sometimes I don't trust the electronic calibration of our pH meters and a little bit of a quickly made buffer in a constant temp. water bath can be a very nice check. Sometimes I don't trust "dilut−it" buffer.

There's also the nice little diddly

$$10 = \frac{[HA]}{[A^-]}^{(pH-pKa)}$$

for estimating relative protonation using a pH meter. Very handy with many aqueous reactions.

−−
Maybe I'm just not a trusting person
.