## Lecture Notes R: Acid-Base Chemistry V

## Concept

I make a buffer by mixing 10 ml of 1 M HAc with 10 ml of 1 M NaAc . About how much acid ( 1 M HCl ) would I need to add to break this buffer (with break meaning cause the pH to drop by more than 1 unit).
a) 5 ml
b) 6 ml
c) 7 ml
d) 8 ml
e) 9 ml
f) 10 ml
g) 11 ml
h) 12 ml

Which weak acid should I use to make a buffer solution with $\mathrm{pH}=3.1$ ?
a) A weak acid with $\mathrm{pK}_{\mathrm{a}}=2$
b) A weak acid with $\mathrm{pK}_{\mathrm{a}}=3$
c) A weak acid with $\mathrm{pK}_{\mathrm{a}}=4$
d) A weak acid with $\mathrm{pK}_{\mathrm{a}}=5$

Suppose I want to make a buffer with a $\mathrm{pH}=3.5$, and I would like it to be more resistant to addition of acid than to addition of base, which weak acid should I use?
a) A weak acid with $\mathrm{pK}_{\mathrm{a}}=2$
b) A weak acid with $\mathrm{pK}_{\mathrm{a}}=3$
c) A weak acid with $\mathrm{pK}_{\mathrm{a}}=4$
d) A weak acid with $\mathrm{pK}_{\mathrm{a}}=5$

Which of the following systems is obviously not at equilibrium (for weak acids with $\mathrm{pK}_{\mathrm{a}}$ of between 3 and 11 ):
a)

|  |
| :--- |
| $[\mathrm{HA}]=1.2$ |
| $\left[\mathrm{~A}^{-}\right]=0.3$ |
| $\left[\mathrm{H}^{+}\right]=1.2 \mathrm{e}-4$ |
| $\left[\mathrm{OH}^{-}\right]=8.3 \mathrm{e}-11$ |
|  |

b)

c)

d)


Consider two acids $\mathrm{HB}\left(\mathrm{pK}_{\mathrm{a}}=4.5\right)$ and $\mathrm{HC}\left(\mathrm{pK}_{\mathrm{a}}=5.4\right)$. I make a solution by mixing together equal amounts of 1 M HB and 1 M NaB . I then add a drop of HC . The ratio $\left[\mathrm{C}^{-}\right] /[\mathrm{HC}]$ is closest to:
a) $1 / 100$
b) $1 / 10$
c) 1
d) 10
e) 100

If I want to increase the ratio $\left[\mathrm{C}^{-}\right] /[\mathrm{HC}]$, which should I add to the above solution:
a) HB
b) NaB

