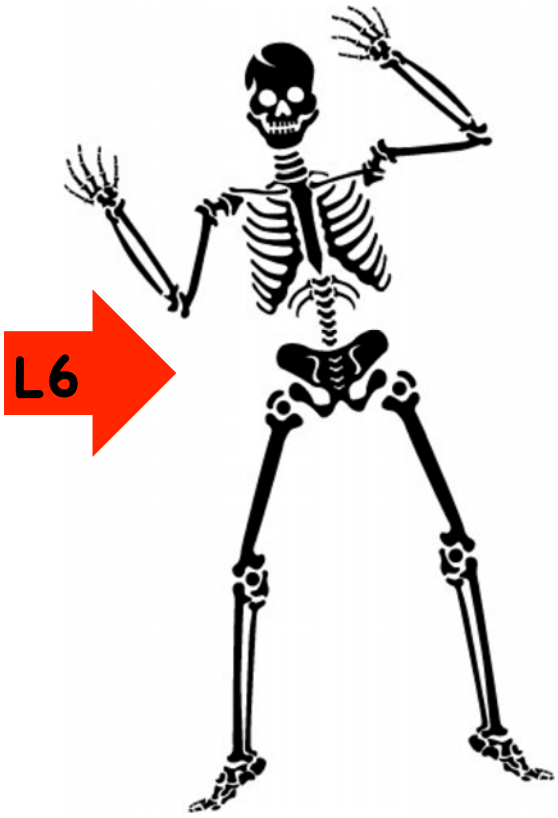
# Acids, bases and pH




***Summary** of material in FIRST YEAR lectures (skeleton notes)*


***You** must put 'flesh' on these 'bare bones'*

*(...not everything is covered)*



# acids & bases

You need to **learn** the
**common weak and strong acids and bases**
(& their **conjugate species**)

**Weak acid/base problems are just *equilibria problems***

- ***write reaction equation***
- ***make a concentration table***
  *also make the key approximation--*
  ***[weak acid or base] = [weak acid or base]$_{initial}$*** *(ie. unchanged)*
- ***substitute into expression for $K_a$ or $K_b$ as appropriate***
- ***solve the unknown... concentration, equilibrium constant***
- ***answer the question !!***

# acids & bases

**Key relationships…**

***Strong acid:*** $pH = -\log [H^+] = -\log [acid]$

***Strong base:*** $pOH = -\log [OH^-] = -\log [base]$

***Weak acid:*** *for* $HA \rightleftharpoons H^+ + A^-$

$K_a = [H^+][A^-]/[HA]$ and $pK_a = -\log [K_a]$

$\approx [x]^2/[HA]_{initial}$ *(assumes* $x = [H^+] << [HA]_{initial}$*)*

***Weak base:*** *for* $B + H_2O \rightleftharpoons BH^+ + OH^-$

$K_b = [BH^+][OH^-]/[B]$ and $pK_b = -\log [K_b]$

$\approx [y]^2/[B]_{initial}$ *(assumes* $y = [OH^-] << [B]_{initial}$*)*

***Inter-conversions:*** $pH + pOH = 14.0 = pK_a + pK_b$



# buffers & titrations

***Buffers (& buffer problems)***

$pH = pK_a + \log ( [A^-]_{initial}/[HA]_{initial} )$ ***is approx. constant***

***If necessary, treat the buffer as a solution containing acid and conjugate base, and solve the problem(s)*** *(… as above)*

***Titrations***

***Indicators: are coloured weak acids/bases;***

***must choose indicator with*** $pK_a \sim pH^{equivalence\ point}$

***Calculations: need to consider what species predominates at the point of interest and account for neutralisation and dilution***

***At the equivalence point:*** $n_{acid} = n_{base}$ *…* ***so:*** $c_A V_A = c_B V_B$

***For weak acids*** *(or bases)*, ***at*** $\frac{1}{2} V^{endpoint}$: $pH = pK_a$ *(or* $pK_b$*)*

# How should I study for this topic?

THINK CRITICALLY!!


Not available for this course

***Ask yourself:*** ***Do I understand everything presented? Can I do all the problems... from lectures, worksheets & tutes?***

***Try to understand the material...***
***(use the syllabus & lectures as a guide)***

***Attend lectures, do worksheets...***

***Read lecture notes & textbook ...***

***Do some more problems ...***
***(from tutorials, textbook & sample exams)***

***Do some more problems ...***

***repeat till you understand it all!!***