
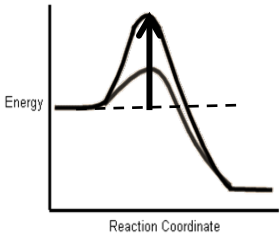
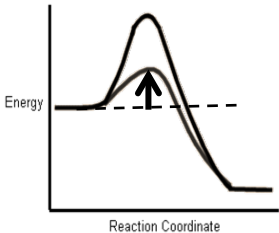
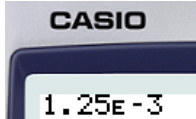
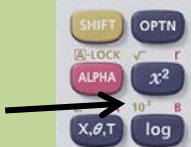


Flash cards for AS 91166 	$-\Delta H$ means the reaction is .....	energy is released to the surroundings	$+\Delta H$ means the reaction is .....
No Brain Too Small	exothermic	exothermic	endothermic
energy is absorbed from the surroundings			a catalyst lowers the activation energy, $E_a$ , for a reaction by...
endothermic	$E_a$ uncatalysed	$E_a$ catalysed	allowing it to occur by an alternative reaction pathway / mechanism
A catalyst does / does not alter $\Delta H$ for a reaction	A _____ increases reaction rate by providing an alternative pathway of lower activation energy so a greater proportion of collisions have the required activation energy and are successful	<u>Surface area</u> Greater surface area $\Rightarrow$ greater rate because there is an increase in the _____ of particle collisions	<u>Concentration</u> Greater concentration $\Rightarrow$ greater rate because there is an increase in the _____ of particle collisions
does not	catalyst	frequency	frequency
<u>Pressure</u> (gases) Greater pressure $\Rightarrow$ greater rate because there is an increase in the _____ of particle collisions	<u>Temperature</u> Greater temp. Particles have more _____ energy and are moving _____	<u>Temperature</u> Greater temp. Collisions more likely to have sufficient energy to overcome the $E_a$ barrier so more _____ collisions	<u>Temperature</u> Greater temp. Molecules collide more frequently AND with greater energy so reaction rate ____
frequency	kinetic faster	successful / effective	increases

the fraction of total collisions that actually result in the formation of the product	if the frequency of effective collisions increases, so does the _____	substance that increases the rate of a reaction but is <b>not consumed</b> in the reaction	for _____ reactions, <b>both</b> forward & reverse reaction rates are affected by the catalyst; $E_a$ for both directions is decreased
<b>effective collisions</b>	<b>reaction rate</b>	<b>catalyst</b>	<b>equilibrium / reversible</b>
$K_c = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]}$ the reaction was...	$K_c = \frac{[\text{O}_2]^3}{[\text{O}_3]^2}$ the reaction was..	the $K_c$ expression for the reaction $2\text{NH}_3 \rightleftharpoons \text{N}_2 + 3\text{H}_2$ is...	the $K_c$ expression for the reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ is...
$\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$	$2\text{O}_3 \rightleftharpoons 3\text{O}_2$	$K_c = \frac{[\text{N}_2][\text{H}_2]^3}{[\text{NH}_3]^2}$	$K_c = \frac{[\text{NH}_3]^2}{[\text{H}_2]^3[\text{N}_2]}$
<u>large <math>K_c</math></u> the concentration of _____ is high the concentration of _____ is low (as product concentration is on top of the ratio)	<u>small <math>K_c</math></u> the concentration of _____ is high the concentration of _____ is low (as product concentration is on top of the ratio)	<u>Equilibria</u> increase in temperature favours the...	<u>Equilibria</u> decrease in temperature favours the...
<b>products reactants</b>	<b>reactants product</b>	<b>endothermic reaction / reaction that absorbs heat energy</b>	<b>exothermic reaction / reaction that releases heat energy</b>
$\text{HCO}_3^-$ is called _____ as it can both donate and accept $\text{H}^+$	$\text{HCl}$ is a _____ acid and completely dissociates in solution	$\text{CH}_3\text{COOH}$ is a _____ acid and only partially dissociates in solution	$\text{HA} + \text{H}_2\text{O} \rightleftharpoons \text{A}^- + \text{H}_3\text{O}^+$
<b>amphiprotic</b>	<b>strong</b>	<b>weak</b>	<b>weak acid</b>

a ____ acid	a ____ acid	Brønsted-Lowry definition of (1) an acid and (2) a base	$HA + H_2O \rightarrow A^- + H_3O^+$
<ul style="list-style-type: none"> <li>fully ionises / dissociates in water</li> <li>reacts completely with water</li> </ul>	<ul style="list-style-type: none"> <li>partially ionises / dissociates in water</li> <li>reacts incompletely with water</li> </ul>	(1) proton donor (2) proton acceptor	<b>strong acid</b>
strong	weak		
another name for the $H^+$ ion	the electrical conductivity of HCl will be high, as there are a large concentration of ____ & ____ ions in solution.	the electrical conductivity of $CH_3COOH$ will be very low, as there are a very low concentration of ____ & ____ ions in solution.	a ____ base <ul style="list-style-type: none"> <li>reacts incompletely with water</li> </ul>
proton	$H^+$ (or $H_3O^+$ ) and $Cl^-$	$H^+$ (or $H_3O^+$ ) and $CH_3COO^-$	<b>Weak</b> (don't say incomplete ionisation / dissociation for a weak base e.g. $NH_3$ doesn't split into ions or dissociate in water....)
the _____ of an acid is a measure of its ability to donate hydrogen ion / protons	the lower the pH (more acidic), the _____ the $[H_3O^+]$	HCl & $CH_3COOH$ of the <u>same conc.</u> & <u>volume</u> will react with the same amount of NaOH / Mg / $Na_2CO_3$ as	$pH = -\log [H^+]$ or $pH = -\log [H_3O^+]$
strength	higher/greater	the total amount of $H_3O^+$ ions available in each is the same	formula used to calculate pH from $[H^+]$
$[H^+] = 10^{-pH}$ or $[H_3O^+] = 10^{-pH}$	$pH + pOH =$	$K_w$ which equals $10^{-14}$ (or $1 \times 10^{-14}$ ) is called...	$[H^+] \times [OH^-]$ or $[H_3O^+] \times [OH^-]$ =
formula used to calculate $[H^+]$ or $[H_3O^+]$ from pH	<b>14</b>	the ionic product for water	$K_w / 1 \times 10^{-14}$

$= \frac{1 \times 10^{-14}}{[\text{OH}^-]}$	$= \frac{1 \times 10^{-14}}{[\text{H}_3\text{O}^+]}$	$\text{pOH} = -\log [\text{OH}^-]$	Concentration of $[\text{H}_3\text{O}^+]$ in a strong acid eg HCl is equal...
$[\text{H}^+]$ or $[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	to calculate pOH from $[\text{OH}^-]$	to the concentration of the acid (in $\text{mol L}^{-1}$ )
<u>Equilibria</u> increase in [reactant] favours the...	<u>Equilibria</u> increase in [product] favours the...	rate of the forward reaction = rate of backward reaction: we call this ____ equilibrium	Concentration of $[\text{OH}^-]$ in a strong alkali/base eg NaOH is equal...
forward reaction / reaction that uses up the reactant, to minimise the change	back reaction / reaction that uses up the product, to minimise the change	dynamic	to the concentration of the alkali/base (in $\text{mol L}^{-1}$ )
increase in pressure causes equilibrium to shift to ____ the no. of <b>gaseous</b> particles, shifts eqm. to side with ____ number of moles of gas	decrease in temp. causes an equilibrium shift to favour reaction that ____ energy, ie shift in the ____ direction.	endothermic reactions will be favoured by ____ temperatures but the reaction rate is too ____	<u>endothermic reactions</u> producing a sufficiently high % product in a short time requires a ____
reduce least/smaller	releases exothermic	low slow	compromise temp. (less % product & fast reaction rate)
solution containing the $\text{NH}_4^+$ ion would be a weak ____ as $\text{NH}_4^+$ is a proton ____	solution containing the $\text{CH}_3\text{COO}^-$ ion would be a weak ____ as $\text{CH}_3\text{COO}^-$ is a proton ____	equation for $\text{HCO}_3^-$ acting as a base is...	conjugate acids and bases differ by a ...
acid donor	base acceptor	$\text{HCO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 + \text{OH}^-$	proton / $\text{H}^+$

if two acids A and B (both 0.100 mol L <sup>-1</sup> ) have a pH of 1 and 2.8 respectively, what does this tell us?	the conjugate acid of NH <sub>3</sub> is	the conjugate acid of HCO <sub>3</sub> <sup>-</sup> is	the conjugate base of HCO <sub>3</sub> <sup>-</sup> is
Acid A is strong acid, B is weak acid	NH <sub>4</sub> <sup>+</sup>	H <sub>2</sub> CO <sub>3</sub>	CO <sub>3</sub> <sup>2-</sup>
the conjugate base of CH <sub>3</sub> COOH is	the conjugate base of H <sub>2</sub> O is .....	equation for CH <sub>3</sub> COO <sup>-</sup> acting as a base is...	2.86 × 10 <sup>-13</sup> is written to ____ s.f.
CH <sub>3</sub> COO <sup>-</sup>	OH <sup>-</sup>	CH <sub>3</sub> COO <sup>-</sup> + H <sub>2</sub> O ⇌ CH <sub>3</sub> COOH + OH <sup>-</sup>	3
write pH 3.467 to 3 s.f.	write pH 3.5 to 3 s.f.	entering a number like 1.25 × 10 <sup>-3</sup> in calculator.... 	writing a number like 3.4562E-04 as seen in calculator as an answer to 3 s.f.
3.47	3.50	1 . 2 5 EXP (-) 3	3.46 × 10 <sup>-4</sup>
substances such as H <sub>2</sub> O, HCO <sub>3</sub> <sup>-</sup> and HSO <sub>4</sub> <sup>-</sup> are examples of _____ substances	complete this for a weak acid HA + H <sub>2</sub> O ⇌	complete this for a weak base B + H <sub>2</sub> O ⇌	to enter "inv log" on a calculator use "shift" "log" to access the ____ button
amphiprotic	A <sup>-</sup> + H <sub>3</sub> O <sup>+</sup>	BH <sup>+</sup> + OH <sup>-</sup>	 10 <sup>x</sup>