EXTRA PROBLEMS FOR STUDY UNIT 8 (ACIDS AND BASES)

H_3PO_4, fosforsuur, kan twee protone aan water skenk om die monowaterstoffosfaatioon, HPO_4^{2-} te vorm. Is die monowaterstoffosfaatioon 'n suur, 'n basis of amfiproties? / *H_3PO_4, phosphoric acid, can donate two protons to water to form the monohydrogen phosphate ion, HPO_4^{2-}. Is the monohydrogen phosphate ion an acid, a base or amphiprotic?*

a) suur. / *acid.*

b) basis. / *base.*

c) amfiproties. / *amphiprotic.*

Identifiseer die konjugaat suur/basis pare in die reaksie van HF en asynsuur. / *Identify the conjugate acid/base pairs in the reaction of HF and acetic acid.*

$HF\ (aq) + CH_3CO_2^-\ (aq) \leftrightarrows F^-\ (aq) + CH_3CO_2H\ (aq)$

Beskryf kortliks wat die ewewigskonstante vir water beteken. / *Shortly describe what the equilibrium constant for water means.*

$2H_2O\ (l) \leftrightarrows H_3O^+\ (aq) + OH^-\ (aq)$ $\qquad K_w = [H_3O^+][OH^-] = 1.0 \times 10^{-14}$ by/at 25 ^{0}C

Gebruik die volgende reaksies om 'n **Brønsted-Lowry** suur-basis reaksie; 'n **Lewis** suur-basis reaksie en 'n **Arrhenius** suur-basis reaksie te identifiseer: / *Use the following reactions to identify a **Brønsted-Lowry** acid-base reaction; a **Lewis** acid-base reaction and an **Arrhenius** acid-base reaction:*

Suur-basis reaksie: ***Acid base reaction:***	**Tipe suur-basis reaksie volgens suur-basis teorieë hierbo gegee:** ***Type of acid-base reaction according to acid-base theories given above.***
$Fe^{2+} + 6H_2O \leftrightarrows [Fe(H_2O)_6]^{2+}$	
$HCl + NaOH \leftrightarrows NaCl + H_2O$	
$2HCN + Na_2CO_3 \leftrightarrows 2NaCN + H_2O + CO_2$	

Bereken die pH van 'n 0.015 M natriumasetaat, $NaCH_3CO_2$ oplossing. Die waarde van K_b vir die asetaatioon is 5.6 x 10^{-10} en die gebalanseerde ewewigsvergelyking is as volg: / *Calculate the pH of a 0.015 M sodium acetate, $NaCH_3CO_2$ solution. The value of K_b for the acetate ion is 5.6 x10^{-10} and the balanced equilibrium equation is as follow:*

$$CH_3CO_2^- (aq) + H_2O (l) \leftrightarrows CH_3CO_2H (aq) + OH^- (aq)$$

Twee suuroplossings het dieselfde konsentrasie (0.05 mol/dm^3), maar verskillende pH waardes. Gee 'n moontlike verduideliking vir hierdie waarneming. Gebruik asynsuur (CH_3COOH) en soutsuur (HCl) om jou verduideliking te illustreer. / *Two acid solutions have the same concentration (0.05 mol/dm^3), but different pH values. Give a possible explanation for this observation. Use acetic acid (CH_3COOH) and hydrogenchloride (HCl) to Illustrate your explanation.*

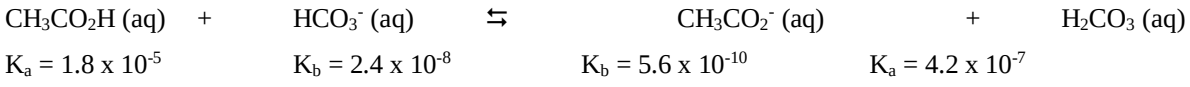
Verduidelik die volgende terme kortliks en gee 'n voorbeeld by elk. / *Shortly explain the following terms and give an example of each term.*

Amfiprotiese verbinding. / *Amphiprotic compound.*

Poliprotiese bases. / *Polyprotic base.*

Outoionisasie. / *Autoionization.*

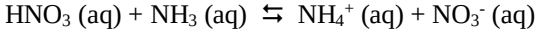
Lê die ewewig in die reaksie hieronder hoofsaaklik na links of hoofsaaklik na regs? / *Does the equilibrium in the reaksion below lie predominantly to the left or predominantly to the right?*



Watter van die volgende is 'n lys van BrΦnsted-Lowry sure? / *Which of the following is a list of BrΦnsted-Lowry acids?*

CH_3CO_2H; $Al(OH)_3$; H_3PO_4
NH_4^+; NH_3; HCl
H_2CO_3; CH_3CO_2H; H_3PO_4

Skryf die gekonjugeerde suur-basis pare in die volgende reaksie neer en benoem die suur/basis en gekonjugeerde basis/suur. / *Write down the conjugated acid-base pairs in the following reaction and name the acid/base and conjugated base/acid.*



Wat is die pH van 'n 0.0012 M NaOH oplossing by 25 ºC? / *What is the pH of a 0.0012 M NaOH solution at 25 ºC?*

Wat is die pH en die ioon konsentrasies in ‘n oplossing van 0.10 M natriumformaat, $NaCHO_2$? K_b vir die formaatioon, HCO_2^- is 5.6×10^{-11}. Wys al jou berekeninge. / *What are the pH and ion concentrations in a solution of 0.10 M sodium formate, $NaHCO_2$? K_b for the formate ion, HCO_2^- is 5.6×10^{-11}. Show all your calculations.*

	pH	**$[Na^+]$**	**$[CHO_2^-]$**	**$[OH^-]$**
a.	5.63	0.10	0.10	2.4×10^{-6}
b.	8.37	0.10	0.10	2.4×10^{-6}
c.	8.22	0.050	0.050	1.7×10^{-6}
d.	5.63	0.10	0.10	4.2×10^{-9}
e.	8.22	0.10	0.050	1.7×10^{-6}

Skryf ‘n gebalanseerde ioniese vergelyking vir die reaksie wat voorkom tussen asynsuur en natriumbikarbonaat neer. Besluit dan of die ewewig hoofsaaklik na links of na regs sal wees. (Soek die K_a en K_b waardes self op).
Write a balanced, ionic equation for the reaction that occurs between acetic acid and sodium bicarbonate. Decide whether the equilibrium lies predominantly to the left or to the right. (Look the K_a and K_b values up yourself).

‘n Oplossing wat voorberei is uit 0.055 mol butanoësuur opgelos in genoeg water om ‘n 1.0 L oplossing te gee, het ‘n pH van 2.72. Bepaal K_a vir butanoësuur deur van ‘n AVE tabel gebruik te maak. Die suur ioniseer volgens die volgende gebalanseerde vergelyking. / *A solution prepared from 0.055 mol of butanoic acid dissolved in sufficient water to give 1.0 L of solution has a pH of 2.72. Determine K_a for butanoic acid using an ICE table. The acid ionizes according to the following balanced equation.*

$$CH_3CH_2CH_2CO_2H\ (aq) + H_2O\ (l) \leftrightarrows H_3O^+\ (aq) + CH_3CH_2CH_2CO_2^-\ (aq)$$