CHEMISTRY DEPARTMENT 2023
S.6 BRAINSTORMING TEST
TOPIC; IONIC EQUILIBRIA
SUB-TOPIC; IONISATION OF ACIDS/BASES AND SALT HYDROLYSIS

NAME……**INDEX number**…….
Signature …… **expected score(%)**…….
Instructions; Attempt *all questions in this paper.*

1. (a) What is meant by the term a weak acid? (01 mark)

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(b) State two factors on which the strength of an acid depends (02 marks)

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(c) Ethanoic acid is a weak acid and has a pKa value of 4.74

(i) Write an equation for the ionisation of ethanoic acid ($1\frac{1}{2}$ marks)

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(ii) Write an expression relating and the degree of dissociation of ethanoic acid. (01 mark)

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(iii) Calculate the ionisation constant of a 0.75M ethanoic acid. (02 marks)

b) Calculate the pH of a solution made by mixing $20cm^3$ of a **0.1 M** NaOH with **$15cm^3$** of **0.1M** HCl. (03 marks)

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2. (a). What is meant by the term pH (01 mark)

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(b) A solution containing 0.15M of ammonia is 1.4% ionised.

(i) Write equation for ionisation of ammonia in water. ($1\frac{1}{2}$ marks)

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(ii) write an expression for base ionization constant for ammonia. (01 mark)

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(c) Calculate the:

(i) pH of ammonia solution ($K_w = 1.0 \times 10^{-14} mol^{-2}\ dm^{-6}$) (2marks)

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(ii) base association constant, K_b (01 mark)

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3. (a). Write the

(i). Equation for the ionisation of methylamine in water (1½ marks)

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(ii). Expression for its base dissociation constant, K_b (01 mark)

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(b).The hydrogen ion concentration of 1M methylamine solution is $2.5\times10^{-13}M$. Calculate the base dissociation constant, K_b, for methylamine. (03 marks)

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4. What is meant by salt hydrolysis? (01 mark)

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(a). Phenylamine hydrochloride undergoes hydrolysis when dissolved in water. Write an equation for the reaction. (1½ marks)

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(b). A **0.2M** solution of phenylamine hydrochloride has a pH of **3.5**. Calculate

(i). the molar concentration of hydrogen ions in the solution. (03marks)

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(ii). the hydrolysis constant, Kh, of phenylamine hydrochloride. (02 marks)

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(c). Expression for the hydrolysis constant, Kh, for phenylamine hydrochloride in terms of Kw and K_b. ($0\frac{1}{2}$ mark)

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5. Sodium benzoate undergoes hydrolysis when dissolved in water.
(a). Write an equation for the hydrolysis of sodium benzoate in water($1\frac{1}{2}$mks)

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(b). Write an expression for the hydrolysis constant, Kh, for sodium benzoate (01 mark)

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(c). The hydrolysis constant of sodium benzoate is 1.6×10^{-10} $moll^{-1}$.
(i). Calculate the concentration of hydroxide ions in a 0.1M solution of sodium Benzoate. (03 marks)

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(ii). State the assumptions made in the calculation in (c) (i) (01 mark)

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(iii). From your result in c (i), calculate the hydrogen ion concentration of the Solution. (02 marks)

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9. (a). A solution contains 0.05 moles of sulphuric acid in 1 litre. Calculate the pH of the solution (03 marks)

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END.