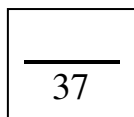# Chemistry 12
Worksheet 4-4
Ka and Kb Calculations

Name _____

Due Date _____

Correct and Hand In by _____

$\dfrac{}{37}$

NOTE: For this worksheet, you must show all of your steps in each calculation. State any assumptions clearly. Make sure your answer is in the correct number of significant digits as justified by the data and make sure your answer has the correct unit. You are allowed one set of corrections.

1. Calculate the $[H_3O^+]$ in a 0.45 M solution of hydrogen sulphide (H_2S). (3 marks)

Answer _____

2. Calculate the pH in a 0.60 M solution of ammonium chloride (NH_4Cl). (4 marks)

$\dfrac{}{7}$
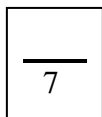
Answer _____

3. The pH in a 0.25 M solution of the acid HBrO is 4.65 . Using this, calculate the value
   of Ka for the acid HBrO. (4 marks)

Answer _____

4. The pH in a solution of benzoic acid is 2.355. Determine the molar concentration of the
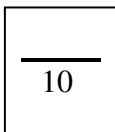   benzoic acid. (4 marks)

Answer _____

5. Find the value of Kb for the oxalate ion ($C_2O_4^{2-}$). (1 mark)

Answer _____

6. The value of Kb for the weak base methylamine (CH_3NH_2) is 4.4 x 10^{-4}. Calculate the value
   of Ka for the acid $CH_3NH_3^+$. (1 mark)

Answer _____

$$\frac{}{10}$$

7. Calculate the pH of a 0.22 M solution of the salt $NaNO_2$. Show all of your steps clearly.
   (6 marks)
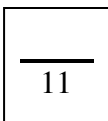
Answer _____

8. A 0.40 M solution of the lactate ion ($C_3H_5O_3^-$) (a weak base), has a pH of 8.728.
   a) Calculate the Kb of the lactate ion ($C_3H_5O_3^-$). (4 marks)

Answer _____

   b) Using the information from (a), calculate the Ka for lactic acid ($HC_3H_5O_3$). (1 mark)

Answer _____

$$\frac{\quad}{11}$$

9. The weak base ethylamine ($C_2H_5NH_2$) has a Kb of 6.4 x 10^{-4}.

   a) Write the equilibrium equation for the ionization of ethylamine. (1 mark)

   _____

   b) What [$C_2H_5NH_2$] is required to produce an ethylamine solution with a pH = 12.102?
      (4 marks)

                                        Answer _____

10. Calculate the pH of a 2.5 M solution of hydriodic acid (HI). (2 marks)

                                        Answer _____

11. What concentration of the base CaO is needed to produce a solution with a pH = 14.00?
      (2 marks)

$$\boxed{\frac{}{9}}$$ Answer _____