

Part A: Strong bases, Weak bases, K_b and pH

- 1) How many of the 6 important strong bases mentioned in your textbook can your PAL team remember? List their names and formulas below.

Name	Formula	Name	Formula

- 2) Complete the weak base table below by filling in each row with any missing formulas, ionization reactions, or base ionization constants, K_b .

Formula	Ionization reaction	K_b
		$K_b = \frac{[\text{CH}_3\text{NH}_3^+][\text{OH}^-]}{[\text{CH}_3\text{NH}_2]}$
NH ₃		
	$\text{CO}_3^{2-}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \leftrightarrow \text{HCO}_3^-(\text{aq}) + \text{OH}^-(\text{aq})$	

- 3) Calculate the pH of a 0.020 M solution of calcium hydroxide.

- 4) Calculate the pH of a 0.020 M solution of pyridine. Your book gives the K_b for pyridine = 1.7×10^{-9} .

Part B: Acid-base properties of ions and salts

- 6) For each of the following salts, indicate whether it will produce an acidic, basic or neutral solution. If acidic or basic, write the hydrolysis (also called ionization) reaction in the space provided.

Formula	Acid, base or neutral?	Ionization reaction
a) $\text{LiC}_2\text{H}_3\text{O}_2$	_____	_____
b) NH_4Br	_____	_____
c) KClO_4	_____	_____
d) $\text{Al}(\text{NO}_3)_3$	_____	_____
hint for d): $\text{Al}(\text{NO}_3)_3$ is soluble in water. When dissolved, Al^{3+} has water around (6 waters).		
e) NaOCl	_____	_____
f) NH_4NO_2	_____	_____
	_____	_____

hint for f): K_a for $\text{NH}_4^+ = 5.55 \times 10^{-10}$ and K_b for $\text{NO}_2^- = 2.17 \times 10^{-11}$

Part C: Calculating pH and pK_b for basic ions

8) You walk into Chem 1B lab and notice that the labels have fallen off two bottles of base and are lying on the floor. One label reads “0.055 M KC₂H₃O₂ solution” and the other label reads “0.055 M NaF solution”. You look up the pK_b of F⁻ = 10.54 and the pK_b of C₂H₃O₂⁻ = 9.25.

a) You measure the pH of both solutions. The pH of the first bottle is 8.74. The pH of the second bottle is 8.10. Without doing any calculations, is the first bottle the KC₂H₃O₂ solution or the NaF solution (hint: just look at the pK_b values)?

b) Now calculate the pH of the 0.055 M KC₂H₃O₂ solution. Is this consistent with your answer above? Show all your work. (If you have time you can calculate the pH for the 0.055 M NaF solution.)