a-) " $-\log K_a = pK_a$ "

$pK_a = -\log(1{,}8\times10^{-5})$

$pK_a = 4{,}74$ //

" $M = \frac{n}{V}$ "

$M_{acetic\ acid} = \frac{0{,}2}{1}$

$= 0{,}2\,M$ //

" $pH = pK_a + \log \frac{[Salt]}{[Acid]}$ "

$pH = 4{,}74 + \log \frac{[0{,}4]}{[0{,}2]}$

$\boxed{pH = 5{,}04}$

$M_{sodium\ acetate} = \frac{0{,}4}{1}$

$= 0{,}4\,M$

b-) $M_{HCl} = \frac{n}{V}$

$0{,}2 = \frac{n}{0{,}01}$

$n = 2\times10^{-3}\,mol$ //

	CH_3COONa	+ HCl	$\longrightarrow$ CH_3COOH + $NaCl$
	$0{,}4\,mol$	$2\times10^{-3}\,mol$	$0{,}2\,mol$
	$-2\times10^{-3}\,mol$	$-2\times10^{-3}\,mol$	$+2\times10^{-3}\,mol$
	$0{,}398\,mol$	—	$0{,}202\,mol$
	$1\,L$		$1\,L$
	$\downarrow V$		$\downarrow V$
	$0{,}398\,M$		$0{,}202\,M$

$pH = 4{,}74 + \log \frac{[0{,}398]}{[0{,}202]}$

$\boxed{pH = 5{,}03}$

c-) $H_2O + H^+ \longrightarrow H_3O^+$

	H^+	
—	$2\times10^{-3}\,mol$	—
	$-2\times10^{-3}\,mol$	$+2\times10^{-3}\,mol$
	$2\times10^{-3}\,mol$	
	$1\,L$	
	$\downarrow V$	
	$2\times10^{-3}\,M$	

$pH = -\log[H^+]$

$= -\log[2\times10^{-3}]$

$\boxed{pH = 2{,}69}$