26. $CH_2ClCOOH + H_2O \rightleftharpoons CH_2ClCOO^- + H_3O^+$

	$CH_2ClCOOH$	H_2O	CH_2ClCOO^-	H_3O^+
initial	C		0	0
change	$-x$		$+x$	$+x$
equilibrium	$C-x$		x	x

$$K_a = 1.4\times10^{-3} = \frac{[CH_2ClCOO^-][H_3O^+]}{[CH_2ClCOOH]} = \frac{x^2}{C-x} \approx \frac{x^2}{C} \qquad x = \sqrt{(1.4\times10^{-3})C}$$

and $$\frac{1.4\times10^{-3}}{[H_3O^+]} = \frac{1.4\times10^{-3}}{x} = \frac{[CH_2ClCOO^-]}{[CH_2ClCOOH]} = \frac{x}{C-x}$$

(a) $x = [H_3O^+] = \sqrt{(1.4\times10^{-3})(1M)} = 0.037\ M$

$$pH = -\log[H_3O^+] = -\log(0.037) = 1.44$$

$$\frac{[CH_2ClCOO^-]}{[CH_2ClCOOH]} = \frac{x}{C-x} = \frac{0.037}{1.000-0.037} = 0.038$$

(b) as above, $pH = 1.59$ and $\frac{[CH_2ClCOO^-]}{[CH_2ClCOOH]} = 0.054$

(c) $pH = 1.95$ and $\frac{[CH_2ClCOO^-]}{[CH_2ClCOOH]} = 0.13$

33. all will be basic

$C_6H_5COO^- + H_2O \rightleftharpoons C_6H_5COOH + {}^-OH$

	$C_6H_5COO^-$	H_2O	C_6H_5COOH	^-OH
St.	C		0	0
Δ	$-x$		$+x$	$+x$
E.	$C-x$		x	x

$$K_b = \frac{[C_6H_5COOH][^-OH]}{[C_6H_5COO^-]} = \frac{K_w}{K_a} = \frac{1.0\times10^{-14}}{6.5\times10^{-5}}$$

$$\frac{x^2}{C-x} \approx \frac{x^2}{C} = 1.5\times10^{-10}$$

$$x = \sqrt{(1.5\times10^{-10})C}$$

$$pOH = -\log x$$

$$pH = 14 - pOH$$

(a) 9.09

(b) 8.94

(c) 8.59

(d) 8.09