

## Problem 1

(a) It has a conjugate base, thus basic

(b) It has a conjugate base, basic

(c) Bond atom has group 3, acidic

(d)  $\text{Cl}^-$  is a strong conjugate acid, thus neutral

(e) conjugate base, basic

## Problem 2

(a)  $pK_a - pH = \log\left(\frac{[HA]}{[A^-]}\right)$

$12.68 - 12 = 11$

$4.79 = \frac{[HA]}{[A^-]}$

(b)  $4.79 = \frac{0.1}{[A^-]} \Rightarrow 0.04 \text{ moles } K_3PO_4 = 8.5g K_3PO_4$

(c)  $12.68 \pm 1$

### Problem 3

(a) Initial is 7.4  
After is 7.45  
Change is 0.05

# Problem 4

$$(a): 7.4 - 9 = \log \left( \frac{HA}{A^-} \right)$$

$$0.025 = \frac{HA}{A^-} \Rightarrow \frac{A^-}{HA} \approx 40$$

(b): More; closer to  $pK_a$



## Problem 5

(a)  $K_0 = 4 \cdot 10^{-7}$

## Problem 6

(a) 4 mg

(b) Move since the equilibrium will shift to the conjugate aspirin's side.