

CHM 102 EXAM II

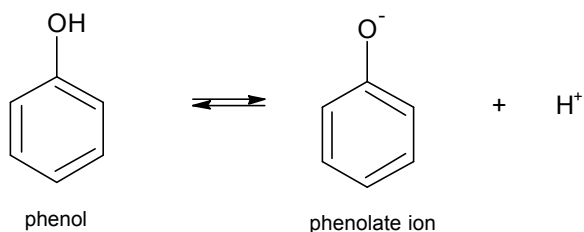
Show all calculations with proper uses and correct number of significant figures. Write in complete sentences. Turn in the take-home questions with this exam. GOOD LUCK!!!

1. How does the percent dissociation for the haloacetic acids vary with the electronegativity of the halogens? (10)

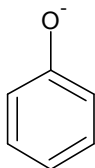
Haloacetic acid	Electronegativity	pK _a
CH ₂ F-COOH	4.0	2.66
CH ₂ Cl-COOH	3.0	2.85
CH ₂ Br-COOH	2.8	2.89
CH ₂ I-COOH	2.5	3.12

Which haloacetic acid would make the best buffer at pH = 2.90?

2. Professor Gross will tell you in organic chemistry that phenol is a weak acid with a K_a = 1.0 × 10⁻¹⁰. Now this is a really weak acid. What is the pH of a 0.10M phenol solution? (10)



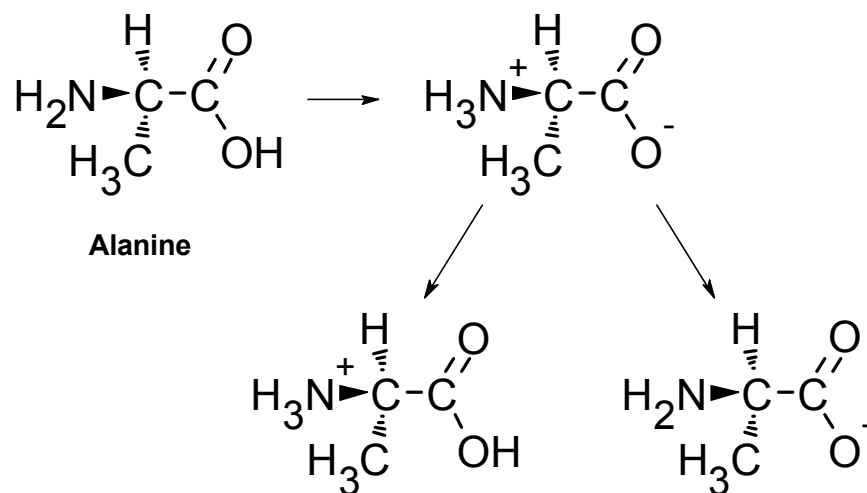
3. Write the hydrolysis reaction for the phenolate ion in water. (5)



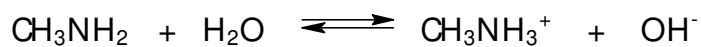
What is the pH of a salt solution of 0.10 M sodium phenolate? What is the percent hydrolysis of the salt? (10)

4. Here is the amino acid alanine. On the zwitterion, circle and label the acidic group (red) and basic group (green). Label the arrows (add acid or add base) under the zwitterion ion to show how it behaves with the addition of acid and base.

(10)



5. For the base dissociation reaction given below, which form, the base or the base cation, is present under the conditions stated. (10)



high pH _____ low pH _____

6. Calculate the pH of neutrality in the freezing waters of Antarctic lakes where $K_w = 1.14 \times 10^{-15}$ at 0°C . (10)

What is the pOH of neutrality at 0°C ? (5)