QUIZ B
Extraction

Name: ____________

1. (6 points) Several common organic solvents are listed below. Underline the most polar. Circle the least polar. Draw an arrow to that which would be the lower layer in an extraction.

ethanol
diethyl ether
ethyl acetate
petroleum ether
chloroform

2. (4 points) Draw the structures of:

(a) methylene chloride

(b) acetanilide

CH₂CH₂

3. (4 points) Compound A is soluble to the extent of 10g/100mL in methylene chloride and 2.5g/100mL in water. A sample containing 3.0g of A is shaken in a separatory funnel with 50 mL methylene chloride and 100mL water. How many grams of A will be in the upper layer? Show your work. (Use the back side of this sheet if needed.)

\[ K = \frac{10}{2.5} = 4.0 = \frac{\frac{3.0-x}{50}}{\frac{x}{100}} \]

\[ 4.0 = \frac{6.0-2x}{x} \]

\[ x = 1.0 \text{ g} \]
4. (6 points) Which of the structures shown below would be extracted from an organic solvent into: (some pKa values are tabulated below; multiple answers possible) [Hint: you may want to draw out a balanced equation for at least one of the relevant acid-base reactions. Remember, the lower the pKa, the stronger the acid). You can assume for this problem that the effect of one substituent on the pKa of another is independent.

(a) aqueous NaOH? \( A, B, C, D \)

(b) aqueous NaHCO\(_3\)? \( A, C \)

(c) aqueous HCl? \( E \)

Those which form charged species will go into aqueous solution. See eq below for why A goes into bicarbonate and B does not.

\[
\begin{align*}
\text{Compound} & \quad \text{pK}_a \\
C_6H_5CH_3 & \quad 41 \\
C_6H_5NH_2 & \quad 27 \\
C_6H_5OH & \quad 10 \\
C_6H_5NH_3^+ & \quad 5 \\
C_6H_5CO_2H & \quad 4 \\
\end{align*}
\]

\[
\begin{align*}
\text{Compound} & \quad \text{pK}_a \\
\text{H}_2\text{O} & \quad 16 \\
\text{H}_2\text{CO}_3 & \quad 6 \\
\text{HCO}_3^- & \quad 10 \\
\text{H}_3\text{O}^+ & \quad -2 \\
\text{HCl} & \quad -7 \\
\end{align*}
\]