

NAME: _____
Chem 227 / Dr. Rusay

Sec. _____

Prelab: Separation and Identification of Unknown Compounds in a Mixture

General Guiding Principles:

Solubilities: Likes dissolve likes. Water / aqueous acid or aqueous base solutions and certain organic solvents are immiscible. Controlling the pH and mechanically manipulating immiscible liquid layers allow separation of mixtures of organic compounds, which have different types of chemical functions.

Solvents / Media:

Organic Solvents: dissolve most non-ionic compounds and most chemical functions.

Aqueous Base (5% sodium hydroxide): dissolves acidic chemical functions

Aqueous Acid (5% HCl): dissolves basic chemical functions

Water: dissolves **charged** stable species → **ionic** and **highly polar** compounds.

Classification of Chemical Functions (uncharged, non-ionic):

Acidic: carboxylic acids, phenols (generally dissolve in basic aqueous solution)

Basic: amines (generally dissolve in acidic aqueous solution)

Neutral: all other functions (generally soluble in organic solvents;
relatively insoluble in water, aqueous base and aqueous acid);

Note: alcohols ionize with very strong, non-aqueous bases, eg NaOCH₃.

Salts: salts of organic functions dissolve in water (**charged species**)

A mixture of two organic compounds will be supplied after completing the pre-lab questions. The two compounds must be separated from each other. Each compound must be purified and identified using spectroscopy and physical properties.

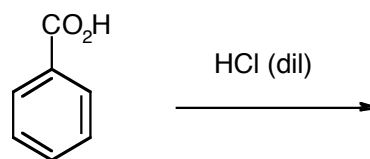
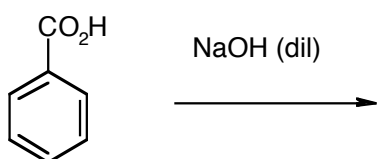
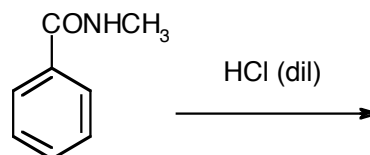
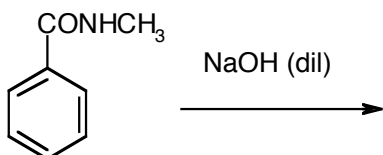
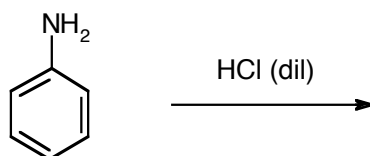
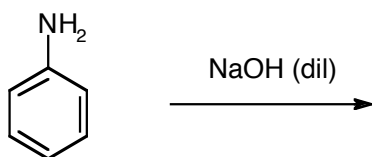
INDIVIDUALLY answer the following pre-lab questions and turn-in at the end of the lab. The unknown sample will then be provided.

Consult: <http://www.chem.ualberta.ca/~orglabs/Interactive%20Tutorials/separation/mastercopy/Extraction.htm>
<http://www.chem.ualberta.ca/~orglabs/Techniques.html>

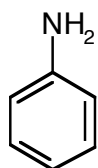
1. Draw structures for the following compounds, identify the function in each as *acidic*, *basic* or *neutral*.

Benzoic acid	N-methylbenzamide	Aniline
<i>acidic, basic or neutral</i>	<i>acidic, basic or neutral</i>	<i>acidic, basic or neutral</i>

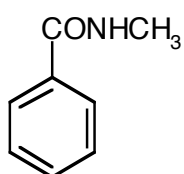
2. Complete the following reactions. (All reactions are at room temperature. Indicate if there is no reaction).



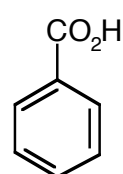
3. Consider each compound and if it is soluble in each of the four choices listed beneath it. Circle all of the choices that are soluble.



dilute acid
dilute base
water
methylene chloride



dilute acid
dilute base
water
methylene chloride



dilute acid
dilute base
water
methylene chloride

4. A methylene chloride solution contains equal molar amounts of aniline, benzoic acid and N-methylbenzamide.

Provide a separation scheme including the compound's structure for each layer and label the layers at each stage as being on the top or bottom in a separatory funnel. Use a separate page, neatly and clearly draw your scheme and attach to this sheet.