Aniline, benzoic acid and benzamide are all insoluble in water, but soluble in ether. Explain how, by using simple laboratory reagents and equipment, each compound could be separated and recovered from a mixture of all three.

\[
\begin{align*}
\text{Aniline} & \quad \text{Benzoic acid} & \quad \text{Benzamide} \\
\text{NH}_2 & \quad \text{COOH} & \quad \text{CONH}_2
\end{align*}
\]

All of the compounds are neutral and will dissolve in an organic solvent like ether.

Benzoic acid is a weak acid and will react with a strong base to form an anion which will dissolve in water.

Aniline is a weak base (whereas benzamide is a very weak base) and will be deprotonated by reaction with a strong acid to form a water soluble cation.

\[
\begin{align*}
\text{dissolve in ether, add 2 M NaOH} & \quad \text{add 2 M HCl} & \quad \text{filter off the crystals or extract into ether and evaporate to dryness} \\
\text{ether layer} & \quad \text{aqueous layer} & \quad \text{ether layer}
\end{align*}
\]