Water is the most common solvent used in separatory funnels due to its low cost and non-hazardous nature. It can effectively remove various impurities from a desired product, including unconsumed acid or base, many ionic salts, and compounds that can hydrogen bond with water. A Fischer esterification reaction demonstrated the effectiveness of using water as a wash in separatory funnels, where it was used to remove catalytic sulfuric acid and excess acetic acid from the product. The use of water alone may not fully remove certain impurities, so additional washes like sodium bicarbonate can be necessary to achieve complete neutralization. It's also important to note that just because a compound is soluble in water doesn't mean it's insoluble in organic solvents, as seen with acetic acid having a moderate partition coefficient between diethyl ether and water. Neutralizing any acidic or basic solutions after exposure to an organic solvent is crucial for preventing unwanted reactions, especially when preparing samples for GC analysis. sodium bicarbonate. The following reactions occur between bicarbonate ion and carbonate ion and acid $\left(\ce{H^+} \right)$ during a wash:

$$\ce{HCO_3^-} \left(aq \right) + \ce{H^+} \left(aq \right) \rightarrow \ce{H_2CO_3} \left(aq \right) \rightleftharpoons \ce{H_2O} \left(l \right) + \ce{CO_2} \left(g \right) \tag{1}$$

$$\ce{CO_3^{2-}} \left(aq \right) + \ce{H^+} \left(aq \right) \rightarrow \ce{HCO_3^-} \left(aq \right) \tag{2}$$

The initial product of reaction (1) is carbonic acid $\left(\ce{H_2CO_3} \right)$, which is in equilibrium with water and carbon dioxide gas. This means that solutions of bicarbonate often bubble during a neutralization wash in a separatory funnel. Safety note: To prevent excess pressure from being generated by the release of carbon dioxide gas into a separatory funnel during neutralization, the layers should be gently swirled together before placement of the stopper. They should be vented directly after inversion, and more frequently than usual. An aliquot from the bottom layer is taken in a pipette tip and touched to blue litmus paper, observing any color change. If the paper turns pink at all, it indicates that the base wash hasn't fully neutralized the organic layer, requiring additional washing. In some cases, an organic layer may be washed with brine to remove excess water. Brine is a saturated solution of sodium chloride (aq) that's highly concentrated and can effectively draw out water from the organic layer. The purpose of this wash is to minimize the amount of water present in the layer before exposing it to a drying agent, such as anhydrous sodium sulfate, magnesium sulfate, or calcium chloride. Diethyl ether and ethyl acetate are solvents that require a brine wash before exposure to a solid drying agent due to their ability to dissolve large quantities of water. These solvents have a higher capacity for dissolving water compared to other solvents (Table 4.5). To illustrate the effectiveness of brine, Figure 4.44 shows a comparison between an ethyl acetate layer washed with water and then dried with magnesium sulfate, and one washed with brine and then dried with the same amount of magnesium sulfate. The lack of clumping in the brine-washed layer indicates it contains very little water. Using too much drying agent can result in the adsorption of compounds along with water, minimizing yields. To demonstrate this, Figure 4.45 shows an ethyl acetate solution containing a faint pink tint due to dissolved red food dye. The addition of white magnesium sulfate caused the drying agent to turn pink as it adsorbed the compound (Figure 4.45a). Further addition made the drying agent even pinker. Dye removal from solution affects drying agent coloration.

Why do we wash organic layer with sodium bicarbonate solution. Why wash with sodium bicarbonate. Why do we wash organic layer with sodium bicarbonate. Why was it necessary to wash the crude methylcyclohexene with aqueous sodium bicarbonate. Why must the organic phase be washed with sodium bicarbonate in the work-up procedure.