Liquid-Liquid extraction is a method by which a compound is pulled from solvent A to solvent B where solvents A and B are not miscible. The most common method of liquid-liquid extraction is performed using a separatory funnel.

Liquid-Liquid Extractor

Compounds which are poorly miscible in organic solvents but highly miscible in water can be extracted into organic compounds either by (1) repetitive extraction with a separatory funnel or (2) by using a liquid-Liquid extractor.

Extraction methods differ depending upon the density of the solvent being used. Solvents more dense than water will require different glassware (or supplemental glassware) vs. solvents that are less dense than water. There are presently a number of setups that can do both. By adding a removable fritted glass tube, and closing the solvent return tap, the setup below can be used to extract water continuously with a solvent less dense than water (such as diethyl ether).

Liquid-Liquid Extraction with solvents more dense than water

Using a setup purchased from Sigma-Aldrich, the method can be accomplished as depicted below in the extraction of methylene blue from water into methylene chloride:

1. The stopcock is closed.
2. Methylene chloride is poured into the trap until it is to the level of the stopcock (b).
3. The aqueous solution of methylene blue is then added to the top of that layer of methylene blue (a).
4. The stop cock is then opened.
5. Methylene chloride is added until it flows into the roundbottom flask (d) through path (c).

6. As the methylene chloride is evaporated it will condense by a water condensor (not shown, above the image) The liquid will follow through the aqueous solution and then through the glass path into the round bottom flask (c).

7. This process will continue for several hours to days.

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