Hexane or petroleum ether based extraction

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Hexane has the advantage of the low cost of the solvent, a high selectivity and also a low decomposition rate of artemisinin. Extraction is carried out, in the more simple way through 3 or 4 extraction cycles of 10 hours or more, where artemisia annua milled leaves are dipped in hexane or petroleum ether heated between 30 and 40-45ºC, with a ratio raw material / solvent of 1:4 (w/w), and renewing the solvent batch for each cycle, or via hot solvent percolation ...

through a packed biomass bed, over a rather short period. More specifically used are extraction processes such as batch percolation or continuous extraction with pressurized solvents where solvent is continuously separated from the extract and recirculated until the biomass is exhausted. The efficiency of extraction, can be increased with the addition of small amounts of ethylacetate to the non polar solvent, as a co-solvent, due to the increase in the solubility of artemisinin in the solvent combination. Counter-current extraction can also be used. Counter current has the advantage of reducing the required amount of solvent.

After extraction has been performed the residual solvent is separated from the biomass and recovered by distillation. Recovering and recycling the solvent lowers the cost of the extraction process. Additionally, the recovery of solvent is recommended for environmental purpose. After recovering the crude extract, a flash evaporation up to 10% of the initial volume is performed and crude artemisinin crystallizes from the concentrated liquor after up to about 48 hours. The mother liquors are decanted and washing of the crystallized material is carried out several times in hexane to get rid of impurities and waxes. The crude crystallized artemisinin is recrystallised in mixtures ethanol / water (96% 1:6 (wt/v) ethanol) optionally in the presence of activated charcoal for decolorization. A final purification can be made by chromatography.

A weakness of the method comes from the risk of no compliance to GMP standards as well as no compliance to safety for staff and for environment.

References : 1; 2; 3; 4; 5.