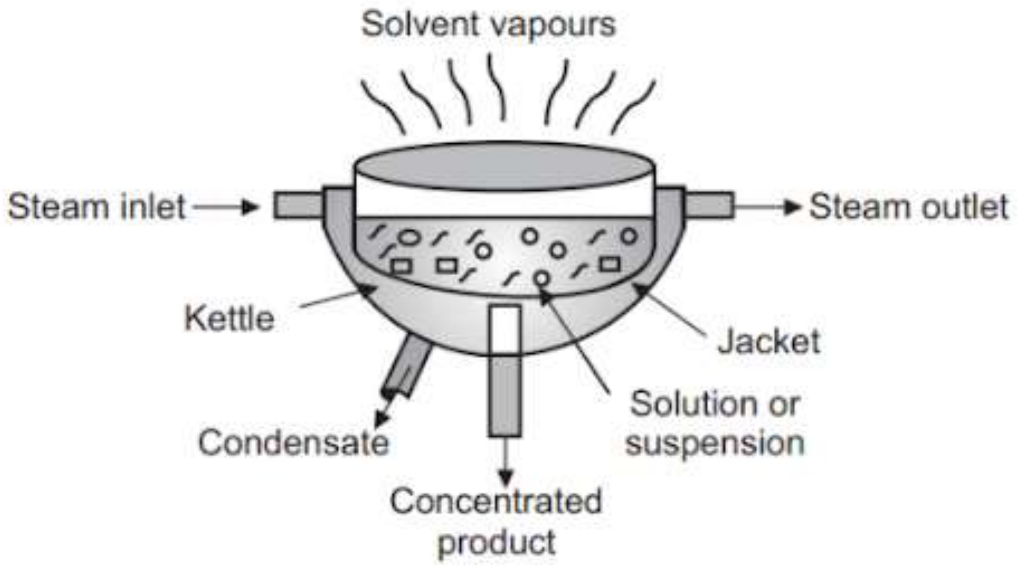
SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

COIMBATORE

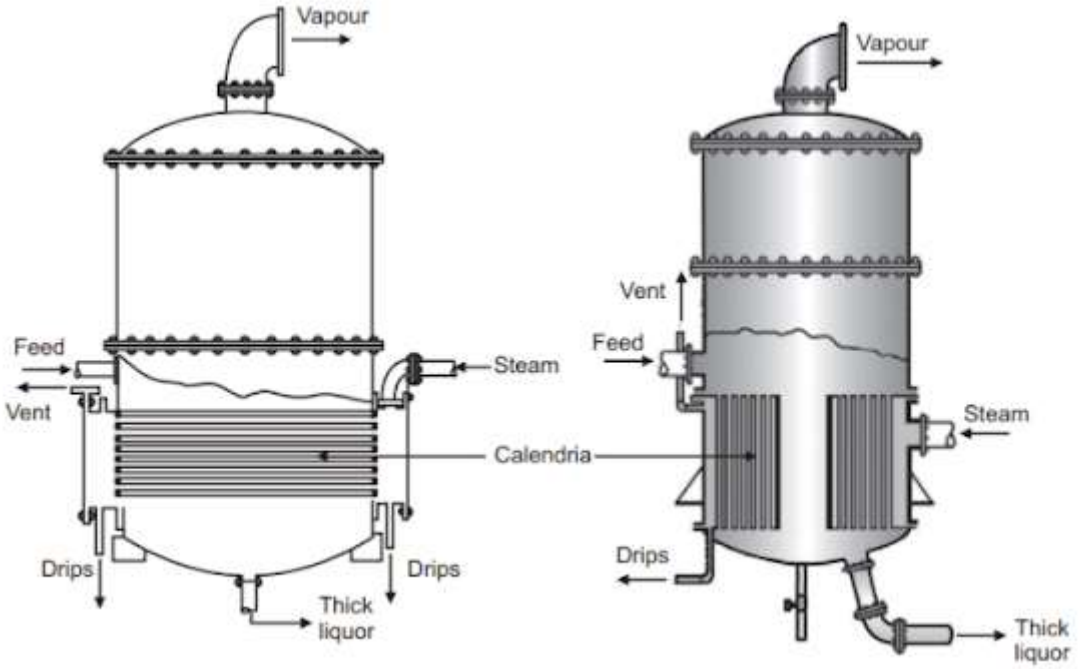
UNIT 2 PUZZLES (PART II)

SUB: PHARMACEUTICAL ENGINEERING

Puzzle 1: Pharmaceutical Syrup Concentration Dilemma A pharma company concentrates heat-sensitive glucose syrup. Initial trials with direct heating caused caramelization. They switched to a jacketed vessel. Identify the equipment from the diagram and explain why it prevents overheating. What are two demerits if scaling to larger batches?
(Refer to images above for steam jacketed kettle.)



Puzzle 2: Herbal Extract Plant Issue A herbal facility uses vertical tube evaporator for clear extracts. Low viscosity feed works well, but viscous new feed causes poor evaporation. Identify type (climbing film) and suggest alternative for viscous feeds, with reason.



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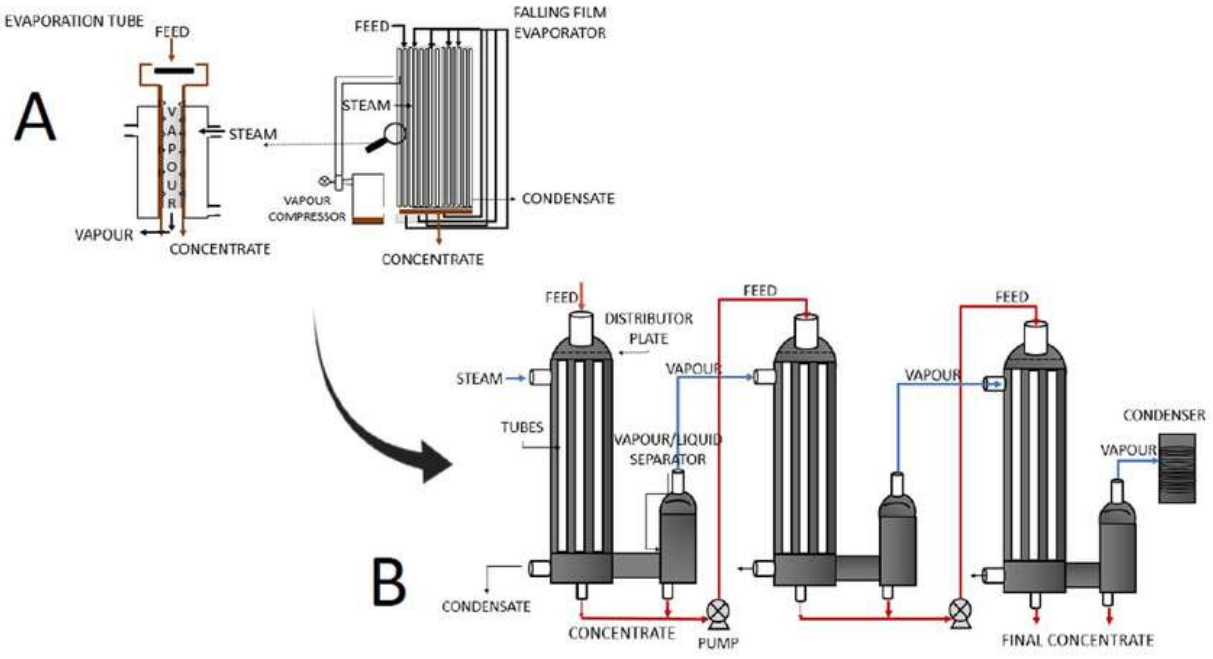
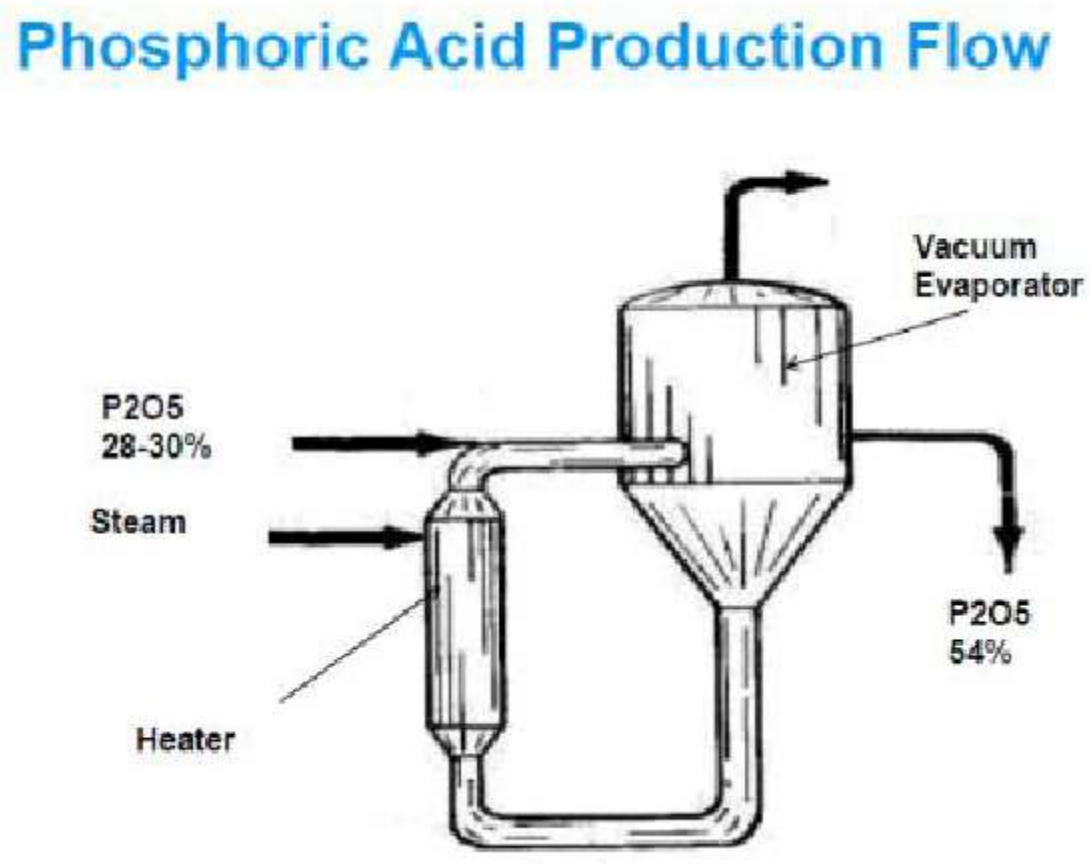
Puzzle 3: Energy Cost Crisis A desalination plant evaporates seawater using single-effect (1 kg steam → 1 kg water evaporated). To cut steam use, they plan multi-effect. From diagram, estimate economy for triple-effect and explain savings principle.



Puzzle 4: Essential Oil Extraction Challenge Lab extracts oil from cloves (high boiling, immiscible with water). Direct distillation risks decomposition. They use steam-carrying method. Identify from diagram and explain why it lowers distillation temperature.



Puzzle 5: Vitamin Purification Problem Heat-labile vitamin decomposes at normal boiling point. Company uses reduced pressure setup. Identify type and benefit. For ultra-sensitive, suggest advanced type from its diagram.

Answer: Vacuum distillation lowers boiling point. Molecular distillation for minimal heat exposure.