Flowsheet:

Amination

Process description

The Johnson Matthey **DAVY**™ amination system centres on a reaction column containing a number of catalyst beds. The process feedstocks are fresh liquid reactant (alcohol or ether), and fresh liquid ammonia. These feed streams mix with a composite stream of recycled amines, reactant and ammonia from downstream distillation.

Preheating follows, with the process stream vaporizing and then superheating as it passes through a series of heat exchangers.

One exchanger in this step transfers the heat from the hot reactor product stream to the feed. Some feed bypasses this exchanger to control the reactor inlet temperature, which in turn regulates the outlet temperature of the crude product stream.

The superheated feed enters the top of the column and passes down through the catalyst beds, reacting exothermically to form primary, secondary and tertiary amines.

The individual amounts of each amine produced are a function of the feed composition. This in turn is determined by the amounts of each methylamine product recycled from distillation to join the fresh feed streams. By varying the feed ratios, the product slate exiting the reactor can be controlled.

The amination reactor operates adiabatically, and in addition to the feed stream temperature helping to regulate the outlet temperature, the heat of reaction is controlled to prevent an uneven, undesirable temperature profile.

The hot vapour product stream containing amines, reactant and ammonia then travels through a heat recovery system before proceeding to distillation.

Flowsheet

Figure 1

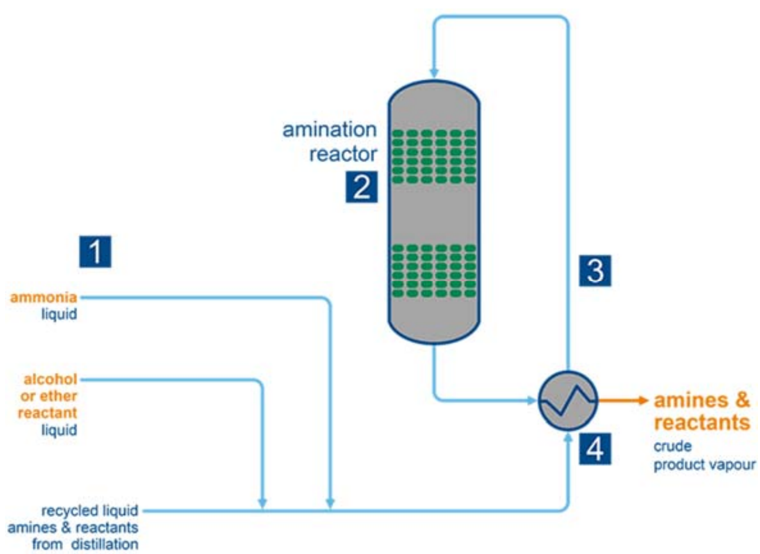


Figure 2

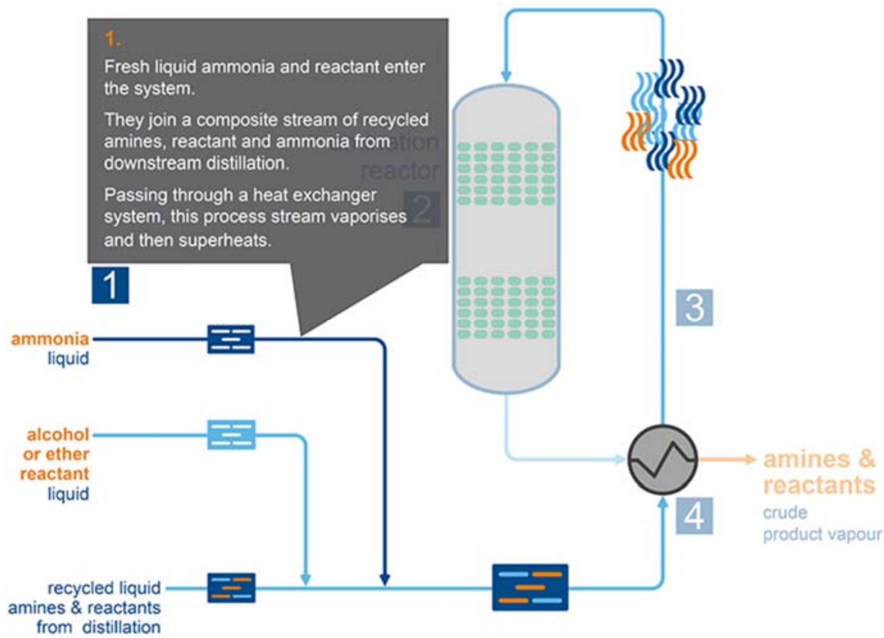


Figure 3

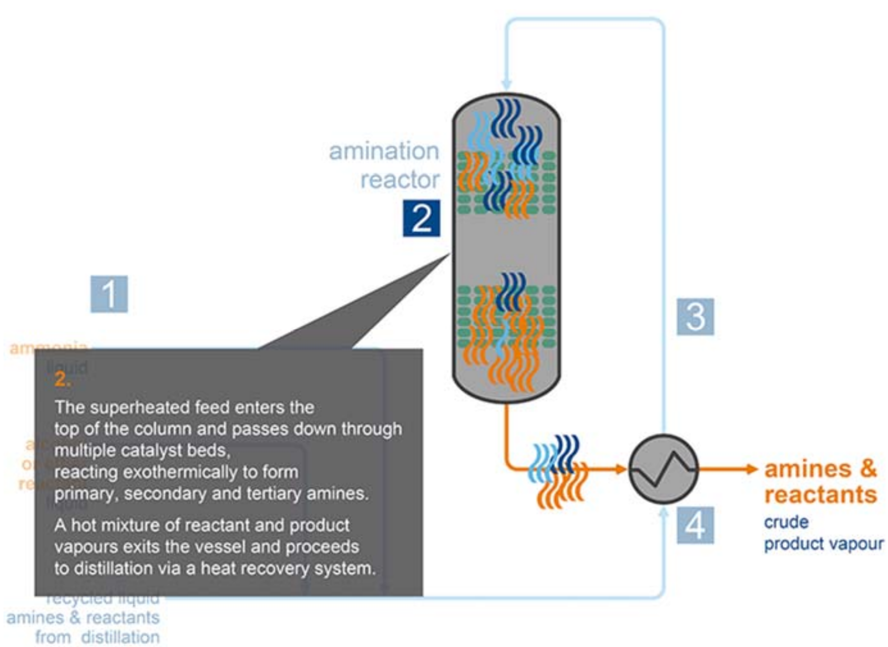


Figure 4

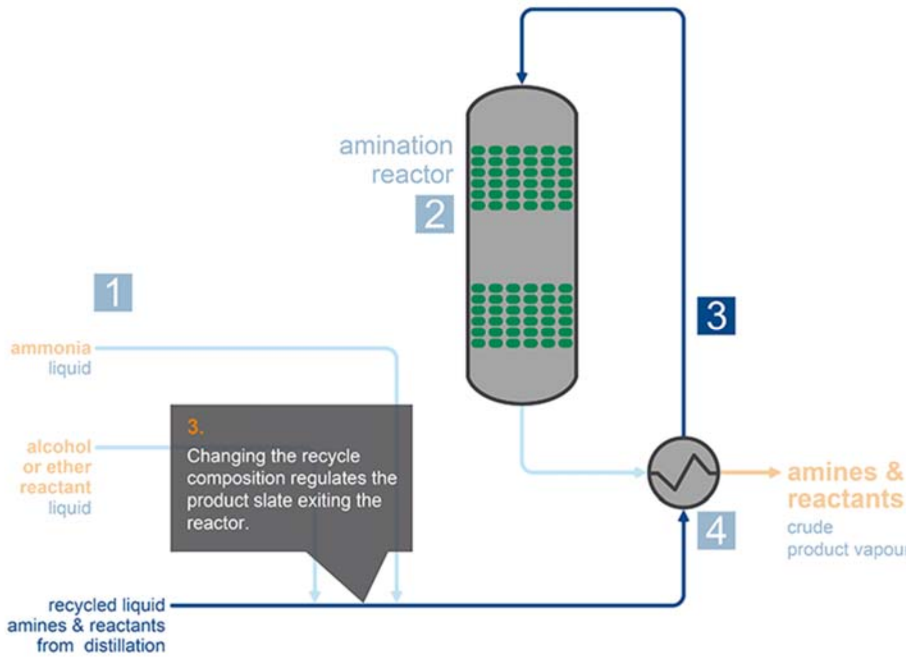
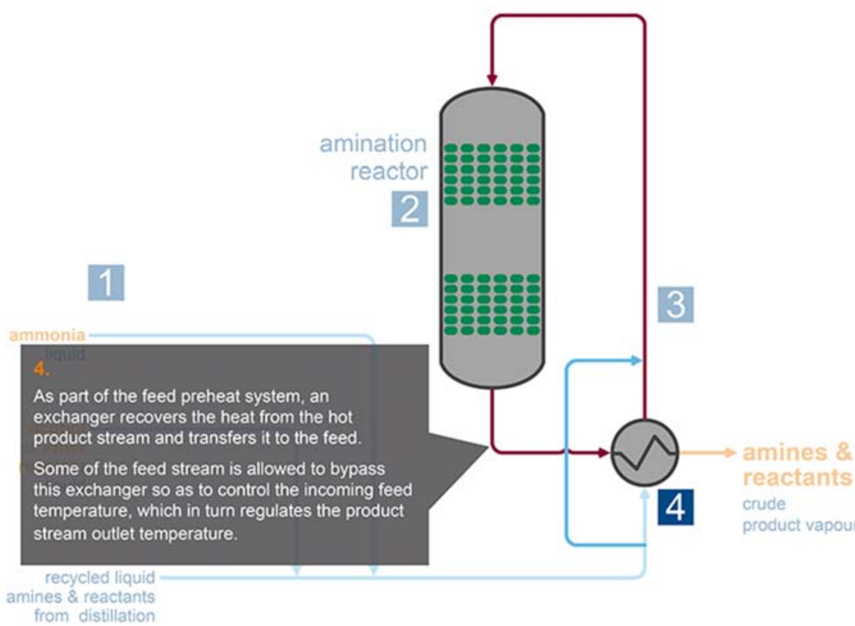


Figure 5



The Johnson Matthey advantage

Johnson Matthey's **DAVY** amination technology forms the cornerstone of our methylamines flowsheet, which offers the following advantages:

High flexible technology	• Allows plant design to deliver optimal product ratios, which can be adjusted online to match future requirements.
Optimized heat integration	• For improved efficiency and reduced operating costs: includes a heat recovery system that recycles exothermic reaction heat to the incoming feed streams. • This reduces required energy input.
Large capacities	• High process output available in a single train.
Lower environmental impact	• Flowsheet includes numerous features to prevent atmospheric emissions and to ensure the plant should fall within legislative limits worldwide.
High product quality	• Lower emissions and liquid waste.

The information contained within this document was previously published on a former **DAVY**™ website.

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