AMMONIA STRIPPING

Systems for ammonia removal from landfill leachate

There are two methods that may be employed for the removal of ammonia from landfill leachate by means of air stripping. The first involves raising the pH to a figure of approximately 12. This is referred to as "pH driven". The second involves raising the temperature of leachate, either with landfill gas or waste heat, to approximately 65ºC to 70ºC. This is referred to as "thermally driven".

Where waste heat is available, the latter method incurs a substantially lower operational cost as chemical adjustment is not required. Where waste heat is not available it will probably be less costly to employ pH driven stripping, although this will depend upon energy and chemical costs at a specific locality.

Organics has experience with both types of stripping system and is able to advise upon both plant and operational costs.

KEY FEATURES

HIGH-RATES OF AMMONIA REMOVAL WITH A SMALL PLANT FOOTPRINT

OPTION OF pH DRIVEN OR THERMALLY DRIVEN STRIPPING SYSTEMS

RESIDUAL AMMONIA CONCENTRATIONS OF AS LOW AS 10 mg/l WITH STANDARD CONFIGURATIONS

TURNKEY DESIGN, BUILD AND OPERATE FACILITIES

PILOT PLANT TRIAL FACILITIES FOR NEW INSTALLATIONS

A RANGE OF INSTRUMENTATION AND CONTROL OPTIONS

ISO 9001 REGISTERED FIRM

SPECIFICATION DATA

Flow rates available:
50 to 5,000 cubic metres per day

Materials:
Materials are selected for duty and range from polyethylene to glass re-enforced plastics (GRP) for low temperature duties up to stainless steels and high-grade alloys for elevated temperature, high-corrosive-potential duties

Heat sources:
Engine exhaust gases, flare exhaust gases, high-temperature hot-water streams, steam

Chemical requirements:
Caustic soda/lime for pH adjustment, sulphuric/ hydrochloric/ phosphoric acid for pH re-adjustment, anti-foaming agent for feed liquids with high foaming potential. Rates of dosing are subject to pH and buffering of the feed.

Energy requirements
Approximately 450 MJ of energy is required per cubic metre of leachate treated. This is equivalent to 25 cubic metres of landfill gas with 50% methane. A 1MW electrical engine will provide adequate waste heat in its exhaust (at~50% of electrical power) to treat 80 - 100 cubic metres per day of leachate

Pre-treatment requirements
Coarse filtration for solids over 2 mm diameter

Land requirements
This is as much a function of the process capacity as the actual process selected. As an indication of land requirements, a 200 cubic metre per day ammonia stripper will occupy approximately 120 square metres

pH DRIVEN AIR STRIPPING *(See datasheet ODSP13 pH driven ammonia strippers)*

The first step in this process is to adjust the pH. This is normally achieved by adding lime or caustic soda. The addition of lime or caustic not only raises the pH but also causes the precipitation of certain salts and larger organic molecules, thus decreasing residual COD.

A plate separator may be employed to remove suspended solids which, in turn, can be returned to the landfill site, where simple ammonia stripping is required, or moved on to either an evaporator or reverse osmosis plant, where down-stream treatment is being carried out.

From the plate separator the leachate is passed to the packed bed stripper column where the partial pressure of ammonia in water is used to extract it from the leachate. It may be necessary to have a multi-staged stripping process to achieve very low levels of residual ammonia. If required the exhaust air from the column may be passed through an acid absorber in order to remove the ammonia. The treated leachate may be finally neutralised with acid before discharge.

Large volumes of air per unit volume of leachate are required to achieve reduced effluent levels, thus leading to increased operating costs.

The process may be more viable at lower flow rates, but this determination would a function of the overall process economics.

THERMALLY DRIVEN AIR STRIPPING *(See datasheet ODSP09 Ammon-ion™ process)*

The capital cost of a thermally driven ammonia stripping facility will normally be greater than that of a pH driven system. The plant will include the stripping column itself, an inlet heater, a cooling tower for inlet air humidification, a steam raising facility to fully saturate the stripping air and, possibly, an exit air condenser to maximise overall plant efficiency. As an option the facility may include a thermal oxidiser to destroy stripped ammonia, or an ammonia gas scrubbing column that can be used to precipitate out ammonia salts.

For further information on either of these systems please contact our Technical Sales Department.

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