

Landfill Leachate Treatment

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PASSION FOR CHEMISTRY

Basic Pollutants

- FOG
- BOD
- COD: surfactants, ammonia, non-biodegradable chemicals, color
- Heavy metals/Hardness
- SS
- TDS
- Micro-Plastics
- Gases/Odours

Basic Treatment Processes

Leachate can be treated by:

1. Biological processes, such as aerobic activated sludge to remove BOD and/or nitrify ammonia
2. Physicochemical processes are used to remove FOG, metals, ammonia, among other pollutants.
3. Membrane separation (MBR) is an effective method for clarifying mixed liquor produced during biological treatment from the clear water.
4. RO technology is effective for removing TDS (dissolved salts)
5. Deaerators or aerators for removing gases and saturating the effluent with O₂
6. Biogas harvesting
7. GAC filtration – Granulated Activated Carbon
8. Anaerobic Digestion for heavy organic sludges can be used to recover Biogas
9. Reed beds are a very effective Nature Based Solution for removing N and P
10. pH correction

Screening/Micro-filtration

- Screening is the first step in the treatment process if there are micro plastics/debris in the leachate

Oil Water Separation

- For removal of oil and FOG from landfill leachate waste-water, gravity separation processes can be used such as API/CPI filters
- Ceramic membrane filtration is also an effective polishing technique to remove colloidal FOG
- DAF = Dissolved Air Filtration is also a very effective technique for separating oils and FOG from leachate waste water

Coagulation/Flocculation/Settling Clarification

- Coagulants are effective chemicals to coagulate colloidal suspended substances
- Flocculants are effective polymers for coalescing coagulated solids into larger heavier settleable particles
- High pH clarification is an effective technique for removing heavy metals and hardness from the waste water

Biological Treatment

- Biological treatment is very effective at using bacteria to break down biodegradable organic pollutants
- A variety of technologies are available such as:
 - ASP: activated sludge process
 - MBR: a combination of ASP and Membrane filtration to separate the solids
 - RBC: Rotating Biological Contactors
 - SBR: Sequence Batch Reactors
 - Trickling Filters
 - Aerated lagoons if land is available

GAC Filtration

- GAC filtration is very effective in removing smaller organic molecules such as persistent organic compounds/emerging chemicals of concern/colour molecules that are hard to remove through coagulation/flocculation/settling clarification

Reverse Osmosis

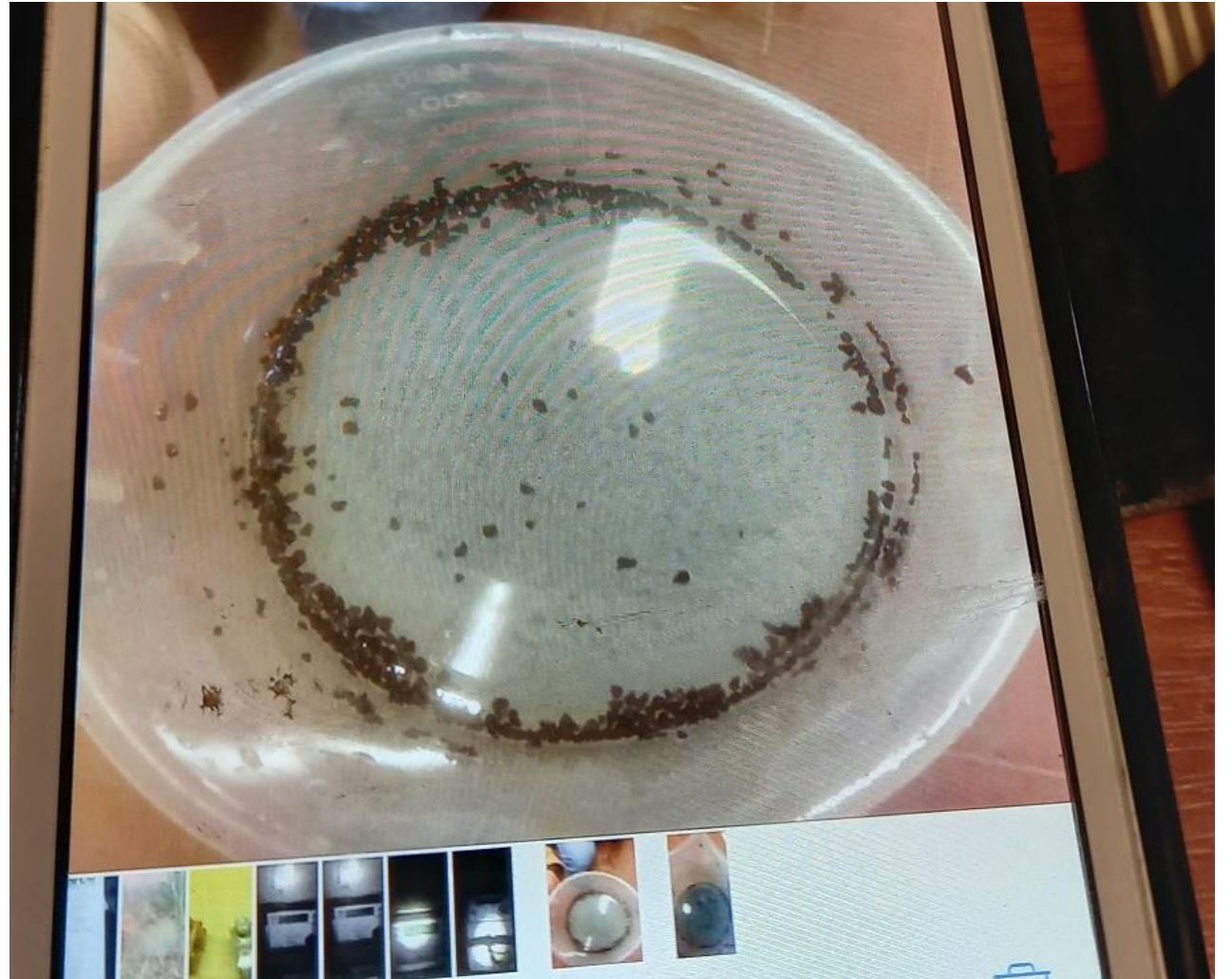
- RO is a proven technology that can remove TDS and heavy metals from leachate waste-water
- However, careful pre-treatment or OEM technologies for bio-fouling/fouling control are needed otherwise the OPEX costs will spiral out of cost for membrane replacement.

pH Correction

- If after clarification/settling with high pH, the pH needs to be lowered, an acid needs to be dosed.
- Several acids are possible to use:
 - H₂SO₄ – cheap but adds Sulphates to the water
 - HCl – cheap but adds chlorides to the water
 - CO₂ bubbling -expensive but environmentally friendly
 - Acetic acid/citric acid – environmentally friendly and biodegradable
 - Phosphoric acid – relatively cheap but adds P in the water

KEC Pilot Testing at Pink Bank Landfill Site, Midlands UK

- Onsite Experiment Conducted on Saturday 20th February 2021 – United Utilities Pink Bank Landfill Site
- Excellent colour removal and floc formation with jar test single pot reaction with GAC and NaOH
- The feed water was a yellowish, murky sample.



For More Information

- For more information/consultancy requests please contact us via email:

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- Or call +44 742 111 3668 (UK/International)