Effective removal of volatile organic compounds released from industrial tanks in petrochemical industries

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Introduction

- Many VOCs are regulated as hazardous air pollutants because they can increase ground-level ozone levels and be explosive and toxic like carcinogenic.
- VOCs can be also precursors of secondary formation of fine particles (PM2.5) in ambient air.
- A large amount of VOCs is released from many industrial processes or activities, including petrochemicals production or refinery facilities, shipbuilding and automobile manufacturing processes, tank refueling and cleaning processes.
- Many industries are suffering from a lot of difficulties in properly controlling VOCs released from industrial tanks which store chemicals (VOCs), during in particular regular cleaning processes or replacing/refueling with other chemicals.

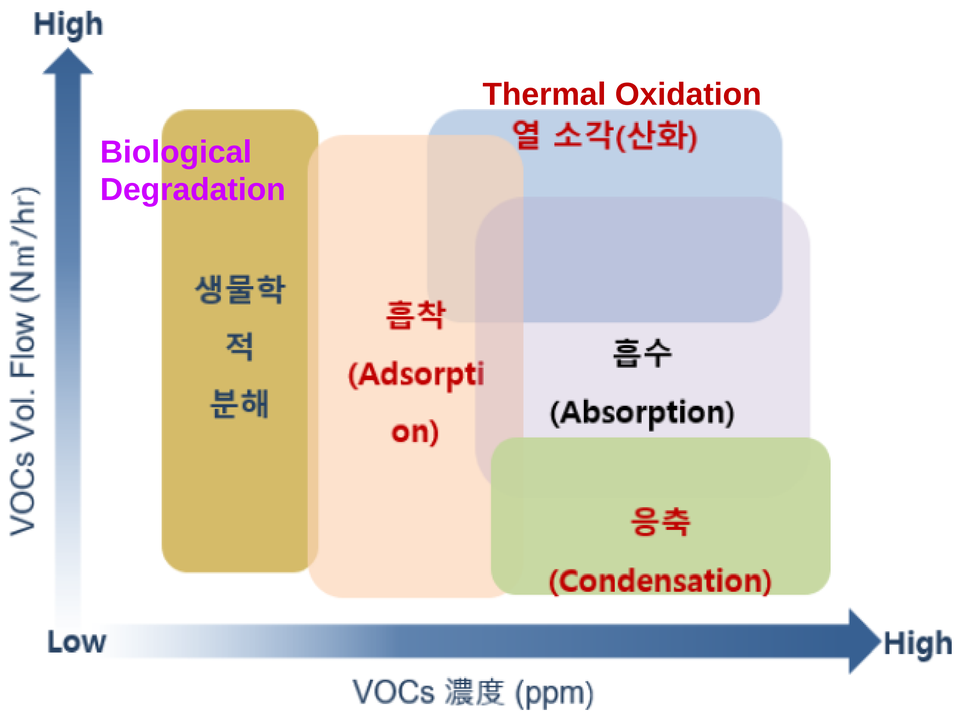

Fig.1. Selection Guide for VOCs Control Technologies

Methods

Tank Emissions in Petrochemical Industries

↓ **Inlet (VOCs Emissions)**

Collection of Air Samples of Emitted VOCs

↓ **Collection Efficiency**

C-VRU (Cryogenic Vapor Recovery Unit)

↓ **Recovery Efficiency**

AC (Adsorption Tower of Activated Carbon)

↓ **Adsorption efficiency**

Final Removal (Air Emissions at Outlet)

Control Efficiency at Outlet)

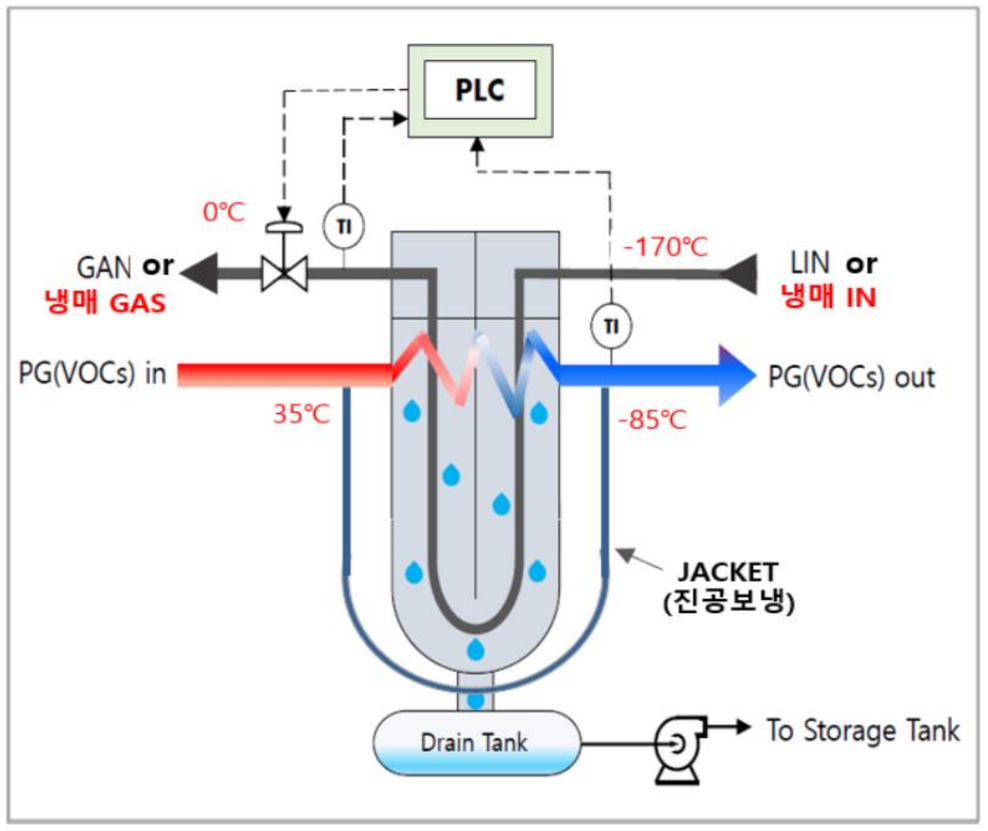

Fig.2. Schematic of Cryogenic Vapor Recovery Unit

Target VOCs : Acrylonitrile from Tank Terminals

Analysis Methods: Gas Chromatography-Mass Detector

Results

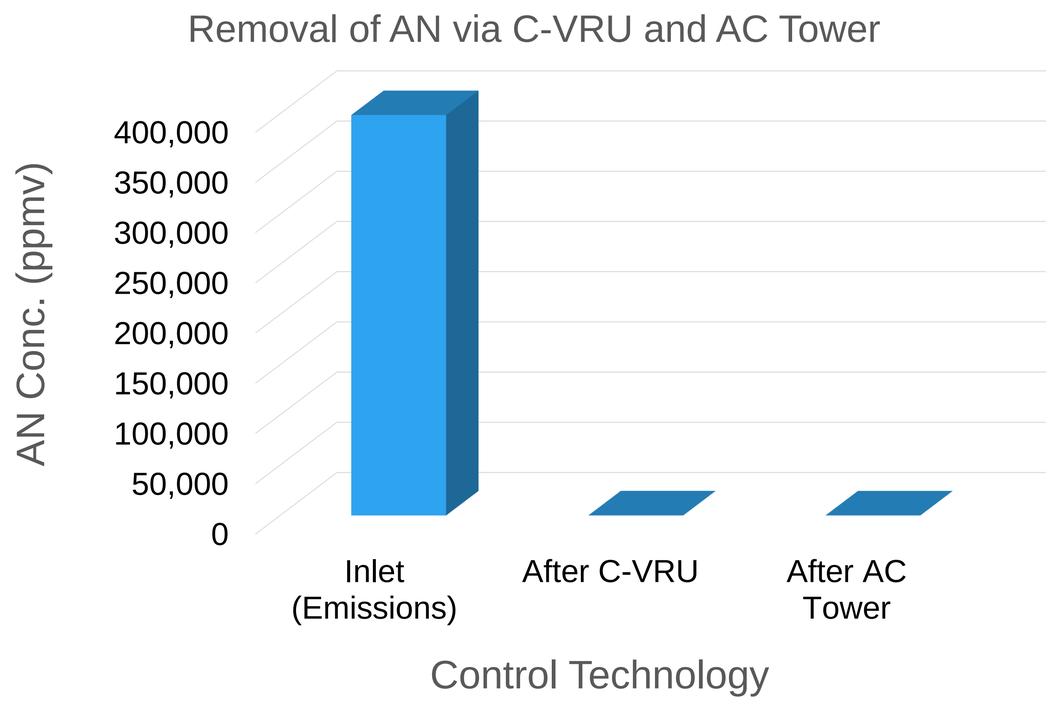

Fig. 3. Removal of VOCs released from tanks of petrochemical plants

Conclusions

- ❖ The released VOCs from industrial tanks were removed more than 99.8% of the initial emissions via an operating cryogenic-vapor recovery unit (C-VRU).
- ❖ An additional adsorption tower can further reduce the VOCs emissions, upto more than 99.9% control efficiency.

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This work was financially supported through the VOCs removal projects for fine particles control (year 2023) of Korea Environmental Industry & Technology Institute.