

Heavy Oil Removal Process from Vinyl acetate

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Abstract: A process for purifying used vinyl acetate contaminated with heavy oil. Vinyl Acetate Monomer (VAM) is the important Co-monomer for production of Ethylene Vinyl Acetate (EVA). Vinyl acetate is contaminated by Heavy Oil from Compressor. This Vinyl acetate contains 5.9 % by weight heavy oil. Heavy oil is removed by packed bed Batch Distillation unit.

Keywords: Vinyl Acetate Monomer, Ethylene Vinyl Acetate, Batch Distillation, Heavy oil.

INTRODUCTION¹⁻⁴:

Vinyl Acetate is the important co-monomer for production of Ethylene Vinyl Acetate. In A plant used VAM stream contaminated with heavy oil coming out form reactor, which is to be purified.

Vinyl acetate monomer, which has the chemical formula $\text{CH}_3\text{COOCHCH}_2$, is supplied commercially in grades which differ in the amount of chemical inhibitor they contain but otherwise have identical specifications.

When a bulk quantity of vinyl acetate monomer fails to satisfy the standard specifications because of excess contaminants, the monomer either will be sold at a significant discount or it will be re-distilled which is an energy-intensive and, therefore, expensive process.

The objective of the present work is to provide a low-cost commercial purification process which will solve the problem of heavy oil in bulk quantities of used vinyl acetate monomer form Ethylene Vinyl Acetate plant without the need of expensive re-distillation procedures.

TABLE 1: Typical manufacturer's specifications

Component	Limit
Vinyl acetate:	% 99.8, min
Boiling point:	72.3-73.0°C
Acidity as acetic acid:	% by wt. 0.005, max
Heavy Oil	None
Water:	% by wt. 0.04, max
Color:	APHA system 0-5
Suspended matter:	None

PURPOSE OF WORK:

To Recycle of Treated Vinyl Acetate Monomer in EVA plant.

To Use VAM as Raw Material for no of processes.

METHODOLOGY ADOPTED FOR PROJECT**STUDY:**

The Aim of project work is to purify the VAM so that which can meet the standards of manufacturers' specifications.

To remove heavy oil from a vinyl acetate Batch distillation unit used.

SOURCES OF CONTAMINANTS:

Vinyl Acetate Monomer (VAM) is the important Co-monomer for production of Ethylene Vinyl Acetate (EVA).

Reaction: VAM + Ethylene \rightarrow EVA

Raw Material: 18% VAM and 82% Ethylene.

This reaction takes place at 1500 Kg/Cm²

For that very big compressor is used to get this

pressure. But during this compression compressor oil is mixed with liquid stream.

PROCESS DESCRIPTION⁵⁻⁷:

- Contaminated vinyl acetate is taken into the Batch Distillation Unit.
- Batch distillation operation time is 8 hrs.
- Boiling Point of VAM is 72.3⁰C and same of heavy oil is around 300⁰C.
- So if Set the batch distillation unit temperature at top around 73⁰C and around 300⁰C at bottom.
- Than VAM vapor form top is being condensed.
- Heavy oil have higher boiling point so it is collected as residue form batch distillation unit.
- Distillate product is almost 100% pure vinyl acetate.
- Residue product is compressor oil.

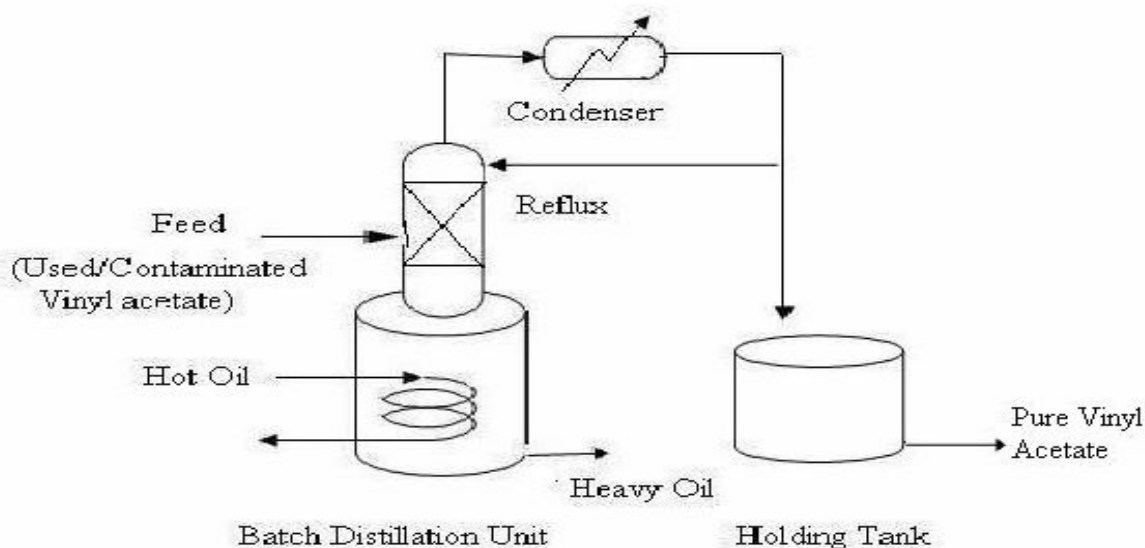
SCHMETIC DIAGRAM OF PROCESS:

Figure 1: Heavy Oil Removal Process from Vinyl Acetate

EXPERIMENT AT LABORATORY⁵⁻⁸:**PROCEDURE:**

- Experiment is done on ASTM unit.
- Batch distillation of contaminated vinyl acetate is carried out in ASTM unit.
- 100 ml of sample is taken into ASTM unit.
- ASTM experiment is carried out.

OBSERVATION:

- After starting of ASTM, after 7-8 mint first drop of distilled is collected.
- Around 93-95 ml of distillate is collected. It takes around 17-18 mints.
- 4-5 ml of residue is remaining into flask.
- After one time ASTM operation, oil content into the distilled is analyzed.
- Now, distilled is taken into the ASTM unit flask, and again ASTM experiment is carried out.
- Experiment is repeated till we are getting the 99.9 % pure distillate.

RESULT:

After Run of ASTM experiment, Oil content into distilled is being analyzed.

Result shown into the table:

ASTM Run	Distillate collected (ml)	Oil content into the distillate(gm)
1	93-95 ml	0.2
2	93-92	0.1
3	92.5	0.05
4	92	0.01

Error: Due to vapour loss into the atmosphere during the experiment, so there is some Error into the total distillate collected.

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- Here aim is to remove the Oil content form the VA sample.
- Means if we want to remove 99.9 % oil form the VA sample.

CONCLUSION:

This result shows that 4 theoretical stages required to separate the heavy oil content from VA sample.

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