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To Study the Process of Recovery MDC Solvent in the SR Plant

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ABSTRACT:

In this work, solvent recovery in pharmaceutical industries has been studied.Solvents play a crucial role in the Active Pharmaceutical Ingredient (API) manufacturing and are used in large quantities. We have given a project of solvent recovery of an API product. Methylene Chloride is solvent which is used in process. Our aim was to increase the recovery of solvent by theoretical possible calculations. We used material balance for determining the losses of solvent ,process mapping for understanding process and we also determined reflux ratio and temperature for boil up rate and rate of recovery.

KEYWORDS: - solvent recovery, pharmaceutical industries, Active Pharmaceutical Ingredient(API), Methylene Chloride

INTRODUCTION:

In this work, solvent recovery in pharmaceutical industries has been studied. Solvents play a crucial role in the Active Pharmaceutical Ingredient (API) manufacturing and are used in large quantities. We have given a project of solvent recovery of an API product. Methylene Chloride is solvent which is used in process. Our aim was to increase the recovery of solvent by theoretical possible calculations. We used material balance for determining the losses of solvent, process mapping for understanding process and we also determined reflux ratio and temperature for boil up rate and rate of recovery.

What Solvent Recovery Is?

Solvent recovery is a critical process for businesses that use solvents in their production processes. Recovering and reusing solvents can help reduce operating costs, increase profitability, and minimize waste. This is particularly important for industries such as pharmaceuticals, chemicals, and electronics, which rely heavily on solvents in their operations.

In addition to the cost savings, solvent recovery can also reduce the environmental impact of these industries by minimizing the number of hazardous chemicals that are released into the environment.

What Are The Benefits Of Solvent Recovery

Solvent recovery is a critical process that offers numerous benefits for businesses and the environment.

By recovering and reusing solvents that would otherwise be discarded as waste, businesses can significantly reduce their operating costs. This is particularly crucial for industries that rely heavily on solvents in their production processes, as solvent recovery can help these businesses save money and increase their profitability.

Furthermore, solvent recovery helps reduce the amount of waste that businesses generate, minimizing their environmental impact and promoting sustainability.

Additionally, many solvents are hazardous and can pose a threat to human health and the environment if not properly disposed of. Solvent recovery helps reduce the release of hazardous chemicals into the environment, thus promoting improved environmental impact.

By adopting solvent recovery practices, businesses can significantly minimize their environmental footprint and contribute to a more sustainable future.

Overall, solvent recovery is an essential practice for businesses that use solvents in their production processes. Through solvent recovery, businesses can reap the benefits of cost savings, reduced waste, and improved environmental impact.

LITERATURE REVIEW:

- Material Balances for Chemical Engineers R.L. Cerro, B.G. Higgins & S. Whitaker

- Distillation Principles and Practice Second Edition

OBJECTIVES:

1) To Understand the process of recovery MDC solvent.
2) To Determine the losses the recovery process.
3) To establish the solution to project the loess.

HYPOTHESIS:

The process of recovering MDC (Methylene Dichloride) solvent in an SR (Solvent Recovery) plant typically involves the following steps:

Collection: Used MDC solvent is collected from various processes and equipment in the plant, where it has been used for cleaning, degreasing, or other purposes.

Separation: The collected MDC solvent is then separated from any contaminants or impurities. This can involve filtration or distillation to remove solids or other substances.

Distillation: The primary method for recovering MDC solvent is distillation. MDC has a relatively low boiling point, so it can be separated from other components through distillation. The MDC is vaporized and then condensed back into a liquid form, leaving behind impurities.

Condensation: The vaporized MDC is condensed back into a liquid state through cooling, usually in a heat exchanger or condenser. Storage: The recovered MDC solvent is stored in appropriate containers or tanks for future use or disposal.

Quality Control: Quality control checks may be conducted to ensure that the recovered MDC solvent meets the required purity and quality standards for its intended use.

RESEARCH METHODOLOGY:

A mixed-methods research design will be used for this study, combining quantitative and qualitative methods. A thorough knowledge of the effectiveness of training programs will be provided by the mixed-methods design by looking at both employee qualitative insights and quantitative results.

Data Collection Methods

Quantitative Data Collection: Collecting quantitative data on Throw out the process before and after training programs.

Questionnaire: Through the process qualitative data on their perceptions of the training programs' effectiveness.

RESULTS:

Table:						
No.	**Column hold up liters**	**Fraction liters**	**Residue liters**	**P liters**	**Recovery %**	**Loss %**
1	200	200	150	3385.64	88.76	11.24
2	200	200	145	3390.64	88.89	11.11
3	200	200	140	3395.64	89.02	10.97
4	200	205	150	3380.64	88.628	11.37
5	200	210	140	3385.64	88.75	11.25
6	200	190	150	3395.64	89.02	10.97
7	200	185	150	3400.64	89.15	10.54
8	200	185	140	3410.64	89.41	10.58
9	200	185	150	3400.64	89.15	10.54
10	200	185	150	3400.64	89.15	10.54
11	200	185	150	3400.64	89.15	10.54
12	200	185	150	3395.64	88.02	10.97
13	200	205	150	3380.64	88.628	11.37
14	200	185	150	3400.64	89.15	10.54
15	200	205	150	3380.64	88.63	11.37
16	200	185	150	3400.64	89.15	10.54
17	200	185	150	3400.64	89.15	10.54
18	200	185	150	3400.64	89.15	10.54
19	200	185	150	3400.64	89.5	10.54
20	200	185	150	3400.64	89.15	10.55

Interpretation:

1. Recovery of the MDC in plant 80% to 90%.

2. Loss of MDC in 10% to 11% in plant.

3. And also column hold up is same.

LIMITATIONS OF STUDY:

The recovery of MDC solvent in the SR plant has certain limitations, including potential losses during the extraction process, challenges in achieving complete purity, and the need for efficient separation methods. A detailed report should address these limitations and propose possible solutions for optimization. The recovery of MDC (Methylene Dichloride) solvent in a Solvent Recovery (SR) plant may face limitations such as:

1) Efficiency Constraints: The efficiency of solvent recovery processes may vary, and not all MDC can be completely recovered, leading to some level of solvent loss.

2) Contaminant Presence: If the MDC solvent is contaminated with impurities or other substances, the recovery process may be less effective, and the purity of the recovered solvent may be compromised.

3) Energy Consumption: The recovery process often requires energy-intensive methods such as distillation or evaporation, which can contribute to high operational costs and environmental impact

4) Equipment Maintenance: Regular maintenance of the equipment used in solvent recovery i 4. s essential. Any breakdowns or inefficiencies in the recovery apparatus may hinder the overall process.

5) Capital Costs: The initial investment required for setting up a solvent recovery plant can be substantial, and the economic feasibility may depend on the scale of operations and the cost of technology

6) Regulatory Compliance: Compliance with environmental regulations and standards may pose challenges. Meeting stringent requirements for emissions and waste disposal can add complexity and cost to the recovery process.

7) Solvent Quality Degradation: The repeated use of MDC in industrial processes may lead to degradation in its quality over time, impacting the effectiveness of recovery efforts.

8) Process Integration: Integration with existing manufacturing processes and compatibility with other chemicals used in the industry can be a logistical challenge.

Addressing these limitations often involves a combination of technological innovation, process optimization, and adherence to regulatory standards.

CONCLUSION:

We have experienced so many thing like, working environment, responsibility of every individual, different working scenario, various situations in plants and engineering concepts. We got the deep knowledge of Distillation Unit Operation, how it works practically, what are the conditions, different types of distillation and its operating conditions. Then we got knowledge about different equipment of other plants and technologies plants have. We have been introduced to rules and regulations of company, we have been aware about industrial safety during the safety week celebration in company. And we learnt the way we should communicate to employees and authorities. From this project I learned how to do team management and how to do team management.