

A REVIEW ON THE PROCESS OF SELECTION DURING WASTE WATER TREATMENT

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ABSTRACT

For the treatment of business wastewater a multitude of techniques is available. It's miles the project of the chemical engineer to pick out methods and to accumulate a treatment collection appropriate for the real hassle. because of the big variety of methods and technique combos, a know-how-based totally machine can be beneficial for the duration of system choice and sequencing. The delivered understanding based system offers a remedy collection based on heuristics and price estimation. depending at the provided data a extra or much less specified remedy series is usually recommended by means of this system. the object describes the goal and development of the expertise based machine, offers a top level view at the program capabilities and affords the end result of an instance program consultation.

Key Words: wastewater, estimation, capabilities

1. INTRODUCTION

Industrial production is widely accompanied by the production of wastewater streams. In contrast to municipal wastewater, the number of involved substances may be much higher, but often well defined. We will find biologically degradable and undegradable organic substances as well as soluble and insoluble inorganic

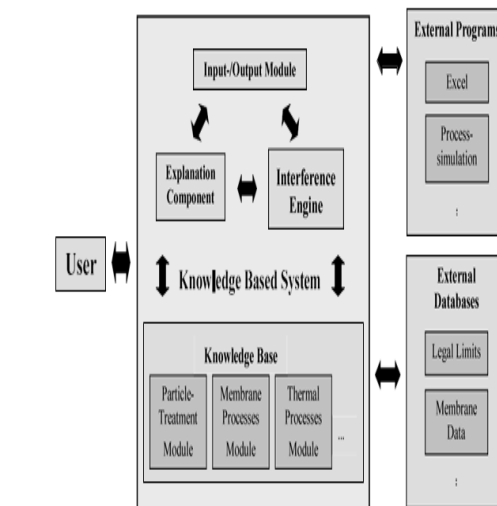


Fig: Structure of the knowledge-based system.

pollution. except the composition, additionally the concentration variety of different pollution varies with the wastewater generating enterprise. it's far obtrusive, that due to the multitude of materials observed in the wastewater using biological remedy, or even greater wellknown, a single remedy step, isn't always enough to meet the legal limits. typically, a combination of different methods is vital, where the proper series is of remarkable importance it's miles the assignment of the chemical engineer to select from the huge

form of tactics, that are suitable for the treatment for a sure wastewater. special attention has to accept to new trends. as an example inside the final years membrane approaches for use in wastewater remedy and recycling of raw materials have been progressed. besides the knowledge of remedy strategies, the engineer has to consider the fee minimization, unique felony limits of the industries and additionally neighborhood instances.

2. Aims

The aim changed into the improvement of a system, which

generates a procedure collection to meet prison limits with regard to the treated waste water stream, via using facts bases, heuristics, manner synthesis and technique simulation.

in an effort to minimize the facts enter and to maximise the usability, this system will provide two choice algorithms, representing special stages of trouble specification. With this shape, it's far ensured to allow easy usage and the generation of exact procedure sequences concurrently.

Table - Implemented processes

Particle separation	Chemical treatment	Thermal processes
Sedimentation	Neutralization	Adsorption
Sieving	Precipitation	Evaporation
Filtration	Lime	Thin film
Flotation	NaOH	Dryer
Centrifugation	CO ₂	Underwater torch
Oil/grease separation	HCl	Distillation/rectification
Skimmer	Sulfate	Extraction
API/CPI	Flocculation	Ion exchange
Biological treatment	Detoxification	Retardation
Trickling bed	Chromate	Stripping
Activated sludge	Arsenic	Air
Anaerobic	Mercury	Steam
Nitrification/denitrification	Oxidation	Crystallization
Phosphate elimination	Chemical (Cl ₂)	Electrolysis

Membrane processes	Chemical (H ₂ O ₂)	Incineration
Microfiltration	Chemical (O ₃)	Fluidized bed
Nanofiltration	Supercrit water	Liquid injection
Ultrafiltration	Wet air	Multiple hearth
Reverse osmosis	Photocatalytic	Rotary kiln
Dialysis	Reduction	Solidification/inertization
Electrodialysis		

A simple choice set of rules generates an overview on applicable approaches, suggests limits in the utilization of processes because of the real waste water composition and generates a simple remedy sequence, thinking of minimization of process charges within the extraordinary treatment steps and the restrict of applicable treatment processes through present pollution.

To generate a more precise remedy sequence a complicated choice algorithm thinking about value optimization of the complete remedy sequence is furnished, which may be carried out to generate an entire remedy sequence or to optimize remedy steps of the simple sequence.

Program structure

The information-primarily based device includes an input/output module, which manages the facts enter and builds the interface to the consumer, a understanding base, an interference engine and an

evidence thing figure1 major part of the information-based machine is the knowledge base itself, which gives the facts on industries, pollutants and strategies for locating the precise answer for a treatment problem. the primary part of the information base is implemented in form of lists.

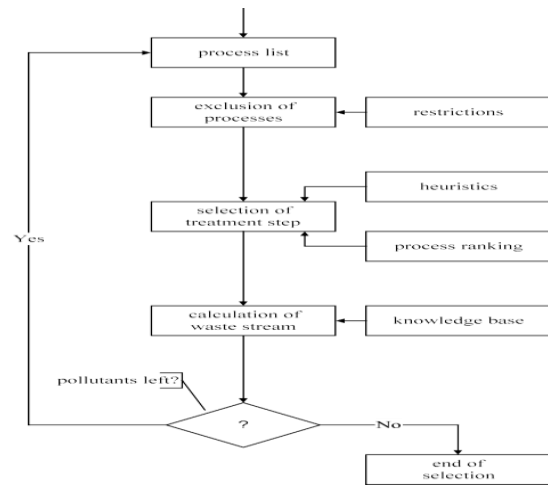


Fig. 2. Simple sequencing algorithm.

This knowledge base is used by the interference engine to solve the present treatment problem, whilst the rationale element offers information on demand why sure treatment approaches are selected

or not.

The entire program is written in PROLOG, a effective programming language for the improvement of know-how primarily based systems

The modular shape of this system allows an clean implementation of latest techniques and update of technique details. every other gain of the modular structure is to have a usable software, which may be extended stepwise by way of enhancing the expertise base and adding modules.

additional capabilities of the system are the opportunity to speak with other software packages like MICROSOFT EXCEL† through the COM-interface and the implementation of outside databases either through COM-interface or sq., to offer clean available facts for emission limits and certain facts on separation techniques.

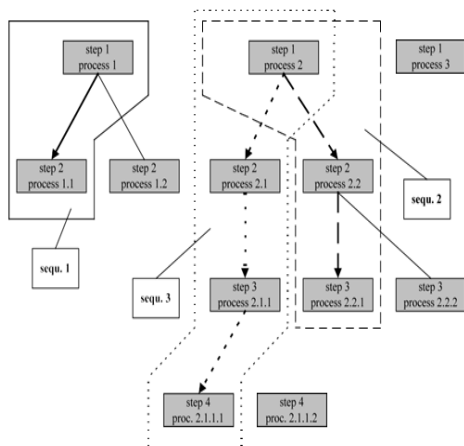


Fig. 3. Advanced sequencing algorithm.

Example

the program dealing with can be defined by using brief instance using the easy set of rules. The wastewater circulation carries debris, oil, acids, metal ions, ionic chromium, fluorine and nitrate. The composition of the wastewater corresponds to used liquor from stainless steel pickling.

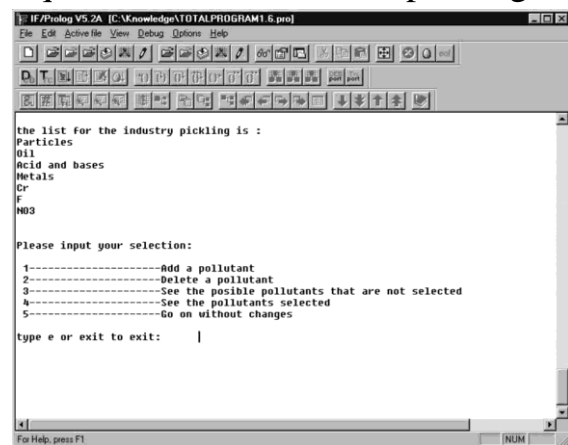


Fig. 6. List of introduced pollutants.

The introduction display screen (Fig. 4) allows special methods to choose the definition of the wastewater movement. the easiest manner of problem specification is to pick out one of the predefined industries (Fig.5). it is also viable to enter the pollution directly or to load a stored session. Deciding on ‘Pickling’ from the list of industries ends in an incorrect wastewater composition (desk 2).

this system allows corrections to the cautioned wastewater move (Fig. 6, offering the listing of additional pollutants.

The cautioned process series (Fig. 7) corresponds well with the traditional manner of treating this kind of wastewater. the steps 'sedimentation' and 'skimmer' are used to eliminate particles and oil. The processes are selected, due to the fact they may be the cheapest techniques inside the corresponding process companies. After adjusting the pH of the answer chromium is dealt with by way of cleansing. To precipitate the metals (together with chromium) lime is used, because it's miles the only reagent to do away with the fluorine ions. Nitrate is removed the usage of a organic nitrification/denitrification step. Describing the session end result, the phrase 'traditional' is selected with admire to the truth that nowadays pickling liquor is regenerated absolutely due to financial reasons.

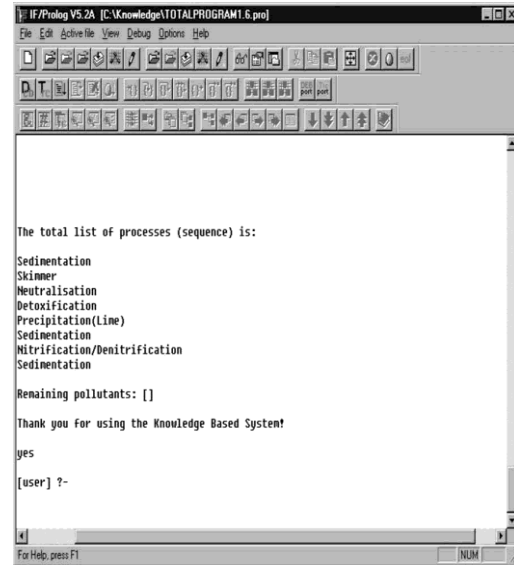


Figure: Generated treatment sequence.

Summary

A expertise-based gadget turned into developed, which generates remedy sequences for commercial wastewater starting from the wastewater composition. The effects of consulting the program correspond nicely with traditional used treatment sequences, most effective considering heuristics and price optimization within the different remedy steps. The effects improve the use of a sophisticated algorithm optimizing the complete treatment series, in place of the one-of-a-kind remedy steps.

Future steps:

destiny paintings will contain the stepwise implementation of removal efficiencies for the

exclusive remedy processes (unmarried element and depending on waste water composition), the extension of the information base (pollution, manner info, legal limits, modules,.. .), the advent of extra parameters to describe the wastewater flow (temperature, flow,.. .) to generate more exact treatment sequences and the attention of recycling talents. A in addition step will bring the extension to water reuse and an interface to procedure simulation tools.

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