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Simulation and calibration furnaces of reduction units viscosity of refinery and optimize the operating conditions to increase efficiency

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ABSTRACT

viscosity Reduction furnace which aims to reduce the viscosity of the core materials, vacuum and atmospheric residue from the tower to blend with fuel oil produced at some refineries in Iran such as Tehran, Arak and Abadan is installed and working. In the furnace, the heat of the combustion gases from the burner to heat the feed displacement and the reaction temperature leads to thermal decomposition reaction of pure radiation with high viscosity paraffinic chains are long, and it makes the product lighter. In this unit, the severity of cracking is not high, because the high intensity can cause unstable ingredients in the products. The purpose of this operation is to reduce viscosity the fuel, without significant change in the stability of the fuel. This resulted in the most severe thermal cracking to lower feeds resulting in the production of gasoline and lighter materials are reduced to less than 10%. Due to the growing interest in simulating chemical processes, chemical engineers, and construction of the project feed the furnaces and furnace simulation is examined. In these simulation profiles of temperature, pressure, products, raw material and other operating parameters of the pipeline are obtained. The results with the selection of an optimal kinetic models by Castellanos et al, based on a set of sub-components of feed divided by the number of carbon atoms modal and the numerical solution of the mass balance and energy than conventional numerical methods (RK) on the elements of a given length in a tube furnace of the displacement of the beam as an ideal reactor, respectively. The simulated data were compared with experimental data for the refinery furnaces decrease viscosity and consistency of results is acceptable.

Keywords: reduce viscosity, furnace simulation, synthetic modeling, and pseudo-elements.

Statement of problem:
To start safe and normal operations of each unit process of understanding the systems and devices that must be placed in service is vital. Basically, the process is considered for the furnace for several functions as follows: generates heat media, drying, vaporization, cracking and reforming. The division of the parent olefin producers to downstream units and other consuming units such as MEG, EDC, HSD (High Speed Diesel) (12) and.... are crucial. The feed is fundamentally changing the nature of natural materials and petroleum base materials (cracking) occurs in these units. In other words, most of the carbon-carbon materials are broken. Considering the need to convert these materials, and the failure of some links in the feed requirement of a link failure, the consumption of energy and this energy is used to power the furnace. Sometimes, in order to reduce the energy consumption of catalysts are used to break ties. On the other hand, heat is an integral part of industry requirements for example Heat Transfer Between Impinging Circular Air Jet and Finned Flat Plate (13). This heat must be produced. Direct heat generated in the furnace in the chemical industry and can then transfer the energy to the water and produce steam for heating currents to be used. Due to the accurate recognition of furnaces can be a great guide for setting up safe and sound practices. Based on the title, the furnace is generally categorized as a giving will be discussed later. 1) Furnace at its operations

divided into four categories based on the purpose of heating furnaces, drying ovens, furnaces and furnace vaporization process. 2) Morphologically classified furnace: furnace by furnace room and furnace cylindrical shape into two main categories are divided as follows (1). 3) Classification according to the arrangement of burners and furnaces are divided into three categories in terms of the burners. Ovens Top Fire, furnaces Side Fire, furnaces Bottom Fire.

Furnace to reduce viscosity

Viscosity Reduction furnace consists of two thermal coils, one as a heater coil and a saturated steam is displacement. Saturated steam coil for supplying steam injection reduces viscosity in the stripper tower is built. Materials used for furnace tubes, usually with 9 percent chromium and 1% molybdenum steel which can be used for beam and displacement. This material because it is the product of sulfur in the exhaust temperature is too low steam heated coils are often ordinary carbon steel (2) to obtain a uniform heat pipe into a horizontal tube furnace used. Horizontal furnace method allows the flow pattern is symmetrical on each pass. In the coil, the furnace by two entirely independent of the flame design. In the first cells feed is heated to reaction temperature (about 700 ° F) and a second cell, the cell's response, which must be fed an appropriate residence time taken to respond (2). Reactive cell size determines the price of furnace.

The process of reducing the viscosity

Reduce the viscosity is a relatively mild pyrolysis process that is used to reduce the viscosity and pour point of vacuum residues used to produce a given shear profile. It as part of this process comes from the catalytic decomposition of food. The oil remains high paraffinic chains attached to aromatic rings are the main cause of high viscosity and pour point (3). The reaction must be carried out in the absence of the separation of these chains and their subsequent decomposition is possible. In the process of analyzing the intensity is not high; it can cause severe unstable ingredients in the products. The purpose of this operation is to reduce viscosity the fuel, without any significant change in the stability of the fuel. This has resulted in the most severely decomposed Feeds reduced to less than 10 percent of the gasoline and lighter materials. The decrease in viscosity and pour point depends on the type of feed. In the wax feeds significant reduction is between 15 and 35 degrees F and the final viscosity is 25 to 75% of the feedstock.

Description of process

Tower residues of atmospheric or vacuum 800 to 950 degrees Fahrenheit temperature inside the tube furnace was heated to a gentle break then suddenly cools (Quenching) to stop the thermal decomposition and then in a flash tower, separated from the material. In addition to reducing viscosity fuel oil in this process is the main objective of this process and the most striking feature of this process is considered, other physical characteristics required for this product as low pour point, well considered and improved. Depending on the nature of the feed may produce lighter products of the process (usually not isolated) is also used, which must be processed before using the product with similar products from other units are mixed.

Feed the reduced viscosity

Residual of atmospheric or vacuum distillation, food process and a series of molecules that are normally in the range of aromatic hydrocarbons semi-polar and non-polar to polar Asphalt are located. These residues 10 to 50 percent, depending on operating conditions and type of feed gas, petrol and diesel (4) Residue divided into components in a mixture of saturated, aromatic, resin and asphaltene and other division’s mixture know as paraffins, naphthenes and aromatics (PNA) (5). Paraffin wax was used in the remaining ingredients in a separate chain or the side chains attached to naphthenes and aromatic groups are present. Side-chain paraffins are usually those who are having 9 carbon atoms. Aromatic refers to a set of one or more aromatic rings, and the remaining components with high boiling (heavier) there. Ring aromatics, two-ring and three-ring aromatic compound commonly found in the residuals. Refers to cyclic naphthenes and alkanes with one to six rings and is most common in the rest of the components in the residue is saturated.

Table 1.1 summarizes the process for reducing the viscosity

Feed	From Unit	Process	Products	to Unit (for)
Residuals	Atmospheric and vacuum towers	Thermal decomposition	Gasoline and distillate are	Hydrotreating
			Steam	Hydrotreating
			Residues with low viscosity	Denuded
			Gases	LPG Unit

Reactions
The main reactions that occur during the operation to reduce viscosity are:
- Separation of paraffinic and aromatic side chains The Rings Silke
- Gums become lighter hydrocarbons
- And at temperatures above 900 ° C, decomposition of the oil rings (6)

Operating parameters
The most important factors in the process of reducing the viscosity of operations, including temperature, pressure and residence time were noted. Generally going up each of these three factors, is namely increasing conversion. To achieve a good conversion, these three factors can be changed. For example, we can raise the output temperature the grill lighter to increase our distribution. However, higher conversion, i.e. breaking down food become into lighter compounds such as gas and diesel. Below, each of these parameters is:

A) Pressure
Pressure in the unit, if the reaction is conducted in the liquid phase, is about 20 to 40 percent of 750 Psig and if the steam output set between 100 Psig to 300 Psig.

B) Retention time
At the same time, depending on the cores apply to vary between 1 and 8 minutes.

C) The outlet temperature
Depending on the furnace outlet temperature it varied between 800 and 930 degrees Fahrenheit (7).

Products
The main products of this process, the shear viscosity pour point and low. However, some diesel and gasoline in the process gained a little quality should be similar to those produced in other units (7).

Components of the reduced viscosity
Although different processes in order to reduce the viscosity the residuals, which are designed and built, composed the various operational units, but all of these processes certainly has the following two parts:
A) Furnace
B) Isolation

Processes to reduce the viscosity
This paper briefly summarizes the three types described
A) Conventional process for reducing viscosity
B) The decrease in viscosity with an evaporator under vacuum
C) The viscosity decreases with a decay heat

A) Conventional process for reducing viscosity
In this process, the main objective is to reduce viscosity of the feed and to achieve a high quality product with low viscosity and can reduce distillate products. Adjust the temperature of the reaction conditions to be provided. At the same time, to prevent coke formation in steam pipes and fix the time, at a minimum acceptable injected. After the heater is partially cooled product into the column separator material will be removed. In the course of cooling after heater enters the separator separate liquid the vapor and gases and products become available. Product gases at the top of the tower tank maintenance and cleaning in addition to the clean, they are cool. By the condensation of steam, go into the tank. Under a controlled pressure of gases, LPG units are entered. Amount The liquid condensate is returned as reflux to the tower and the rest are sent to a stabilizer (Figure 1-1 and Figure 1-2).

B) The sudden decrease in viscosity with an evaporator under vacuum
This process is used when you want to eat more of the products become lighter. Reduce the viscosity of the fluid column separator in the process, sent to a vacuum distillation tower. Vacuum distillation tower to the bottom of a heavy material that is injected steam, shed. After washing vapor condenses liquid partially is balanced look. In the process, we have two types of gasoline, a column separator vacuum distillation unit in order to reduce viscosity, and them is called light and heavy gasoil. These are then mixed together to form a high quality product. Tower vapor vacuum to a vacuum system sent a three-stage liquid and vapor is collected in a tank. Figure (2-2), the viscosity decreases with an abrupt evaporator under vacuum to it.

C) The viscosity decreases with a decay heat
This process is similar to the second process, the vacuum tower gas oil and gasoline is sent to a single parser heat to reduce viscosity is decomposed into a tower. This process is used when you want have minimum point loss or maximum lighter products. The products of this process are heavy oil, light oil, with a wide range of distillation. Reduce the pour point at least in cases where the feed contains a large wax is acceptable, because the overall conversions vacuum furnace oil to reduce viscosity, destroyed all the wax feed and provide a fuel with a minimum loss point.

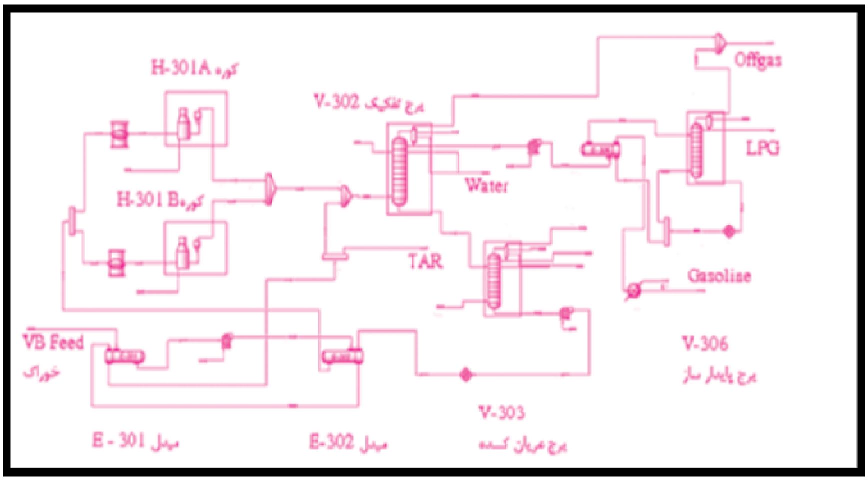

Figure 1.1 The process of reducing the viscosity (8)

Viscosity reduction process furnace, heart of viscosity reduction furnace, simulation of viscosity reduction furnace, involves simulating the thermal decomposition reaction was carried out in a tube Furnace similar CFD analysis of slot jet impingement cooling on curved surface (14) and obtain the products of the reaction are exits The Furnace. Because the objective of the project furnace (viscosity reduction furnace of oil refineries) or heater coil type it is important that the manufacturer of this type of furnaces used to simulate the furnace is examined computer simulations demonstrate the importance of understanding the dynamics. These techniques include: 1) the infusion volume factor (SVF) 2) Kinetic Model 3) castellanous model due to the flexibility of the castellanos model of computation, citizenship constant reaction temperature, molecular weight and a proven ability of the model to predict the behavior of the thermal decomposition reaction inside the tube furnace, the model selected for computer simulation to reduce viscosity furnace was used (9).

Simulation procedures of viscosity reduction furnace
A) Split the feed to the sub-components: a computer simulation before anything should feed divided government. For the split feed conversion TBP curve based on volume percent distillation unblock the number of components is given, and calculate the properties of the sub-components. With this work (the way it should be) the physical and thermodynamic properties of a given feed and will be available for use in the kinetic model. Split feed into the sub-components, the TBP curve is plotted in terms of total volume percent distillation trash and the algorithm described in section (4.3), the curve is divided into a certain number of pseudo-components based on the number of carbons.
B) Determine the properties of pseudo-elements: after pseudo-element feed was supposed to be divided into physical and thermodynamic properties, it must be calculated with sufficient accuracy. The thermo-physical properties of

simulation to calculate the imaginary part of the empirical relationship is Ahmed and this is mainly due to the relationship between the properties of each pseudo-component with sufficient accuracy as a function of the number of carbon atoms suggests and we are in a simulation, based on the number of carbon atoms split up imaginary components.

C) Selection of Thermodynamic Methods: After the split feed component properties like temperature, pressure and number of sub-components, the input displacement of the first tube is clear. As mentioned kinetic models are selected and specified. Select a method for the calculation of thermodynamic equilibrium and determination of thermo-physical parameters involved in the calculations, such as enthalpy, fugacity and equilibrium constant is also required. The method selected thermodynamic equations of state that used the equation of state, the Peng-Rabinson equation.

D) Divide the pipe into smaller parts (select elements): As mentioned, the purpose of simulation, to obtain the concentration profiles of components, temperature and pressure in the pipes and the ability to change any of the inputs to estimate the parameters of furnace is registered. The goal is not possible unless the volume control, the reactor has chosen to write about the mass and energy balances.

Volume control is part of the furnace tube which is extensive. View the volume control (here the volume control) is generally limited by the numerical solution method. In this project, the reactor cores where the tubes in both directions (pass) the upper part of the movement started, then move over the length of furnace, and will enter the beam. The pipes, the furnace will receive a certain amount of heat. Because furnace heat flux is assumed to be constant throughout the motion and radiation (although in each sector, varies heat flux) the length of a horizontal tube furnace at wide stretches selected as an element (provided that this limitation on the numerical method does not used)

E) Mass and energy balances on each element: after the element, the element is writing the mass balance and energy. Here is an element of a section of the reactor, the mass balance and energy writing it is assumed that each element of a reactor is an ideal form of crime, the bulk of the mass moves and no heat due to viscosity forces, cannot be exchanged between the elements and the environment. The steady state of mass and energy balances, mass and energy of the input and output of the system, including changes in the system and the environment are explored. The resulting mass and energy balances on the individual components and the entire system into a system of differential equations you need to choose a method of numerical solution to solve it.

F) The method of numerical solution of differential equations: ordinary differential equations in general divided into two categories, initial value problems (IVP) and boundary condition problems (BVP).

Methods for solving the system of equations the IVP direct or indirec used. Direct methods for solving differential equations based on the use of guessing and error, and while indirect methods for each variable in the output of the initial guess, and the guess are intended to be corrected at a later stage. The equations, the method can predict indirect methods - Milne and Adams-Moulten and Hamming. The direct methods include the method of Runge-Kutta, Euler is the application of numerical methods for solving differential equations of the selected IVP, Ranjan technique - Kota along with other issues that are listed in the following sections in this chapter will be discussed in detail.

G) calculation of pressure drop: As will be discussed later, the solution of differential equations of mass and energy balance depending on the length of a given element, the only pseudo-element concentration and temperature on the output element will be achieved also requires that the pressure at the outlet of the element. What is at stake here, which is calculated as the product of the pressure and pressure drop across the element as a parameter required by the simulator is to solve the system of differential equations in the elements. In this project Wylie method was used for calculation of single-phase and two-phase pressure drop (10).

METHODS

viscosity reduction furnace of Refinery designed and built by Foster Wheeler, a horizontal furnace is the tubes in both mobility and beam in two passes (Pass) are widespread throughout the furnace.

The fuel furnace for good quality and favorable viscosity the distillation residue (atmospheric or vacuum) and embedded style products manufactured the processes is usually not isolated. Given the preceding description and data sheet information finery furnace to reduce viscosity, reduced viscosity to simulate refinery furnace and charted on the drawing, the results obtained with the simulation of Petro Sim software has been examined finally the comparison of the results is discussed. The displacement for heating the feedstock to the reaction temperature and embedded in this case occur without reaction. Two series of the tubes with fins (extended) without fins (Bare) are composed of the same size. Bare tubes are more but less number of transmissions. Tube (expanded) the top of the furnace, the temperature is relatively little work has started near the radiation heat flux is increasing, switching places with the Bare tubes.

Specifications required by the simulation:

Table 1-2 details the replacement of pipes

	Quantity (How to)	Unit
Pass	2	
Tube	Horizontal	
Outer diameter	5	in
Internal diameter	4.25	in
Thickness	0.375	in
Number of finned	18	
Without Blades	38	
Tube length per pass	61.5	ft
Effective length	1772	ft / pass in the thermal calculations
Finned tube heat transfer surface	3540	ft^2
No fin tube heat transfer surface	3060	ft^2
The total area available	6600	ft^2

The beam reaction actually occurs in this area. Two rows (pass) and the heat flux tube is the tube without fins (Bare) was used (5 times the displacement).

Table 1-3 tubes of the beam profile

	Quantity (How to)	Unit
Pass	2	
Tube	Horizontal	
Outer diameter	4.5	in
Internal diameter	3.75	in
Thickness	0.375	in
Number	72	
Tube length per pass	61.5	ft
Effective length	2214	ft/pass
The total length	2268	ft/pass
Heat flux	12000	$Btu/hr/ft^2$
The total area available	5200	ft^2

Data input and output, viscosity reduction furnace of refinery

Flowchart Program

Overview and assumptions

The algorithm is divided into two parts. In order to achieve steady temperature in 800° F feed composition, increases temperature and decreases pressure. In the second part, which was fed to the reaction temperature, feed composition is changed and slowly decomposing lighter components. The higher temperature and pressure decrease rapidly changed and the amount of light produced pseudo-components will be enhanced. The output of this part the program consists of lightweight materials, manufacturing, temperature, pressure and steam quality has been asked to simulate this process. The first flowchart in this section required data such as P, T, and the rate of feed and TBP-like elements define the thermo-physical properties are calculated. Then select the element balance calculations on the input data to the first element. After determining the phase state, the enthalpy of mixing calculated by solving the energy balance enthalpy output gain. Guess-and-error method with the enthalpy, temperature, pressure, quality and composition of the phases of the elements is achieved. This process is continued until the reaction temperature is 700° C and then the second part is to calculate the thermal subsystem vested. The thermo-physical properties necessary for the calculation of the pressure drop and the computed latent heat of vaporization at the temperature, pressure and composition of medium components has been done. Flowchart Part Two: The 20th step of the flow temperature range ° F800 is the first part of the reaction begins. Here's a change in the composition of the sub-fractions have not yet been temperature and pressure as before the output element calculations, such as the presumed recipient already done. The reaction constants as a function of temperature and molecular weight is determined for each sub-component, after calculating the coefficients of the RK equations are solved and the concentration of components in the output element is calculated. Here is the output element if the carbon number of components n n n-2 like a pseudo-olefin saturation and reduction. The rest of the calculation is the same as the first. This process continues until the end of the last pipe section displacements and outputs obtained. The results of the computational model are based on the following input feed.

Table 1-4 Data of viscosity reduction furnace of refineries

Inlet temperature	608	K°
Outlet temperature	760.8	°K
Inlet pressure	3272.2	kpa
Outlet temperature	687.25	kpa
Design temperature	925	°F
Design temperature	650	psig
Feed Dubai	277875	lb/hr(liquid)
Liquid outlet	254275	lb/hr
Steam output	23600	lb/hr
Steam quality at the outlet	8.5	percent
API grade feed	10	-

Table 1-5 details the results of a computational model based on feed

Oil Fractions & Composition	To Furnace (wt %)	Outlet Stream (from Furnace, wt %)
H2S	0	0.2458
C2	0	0.796
C3	0	0.5507
C4	0	0.5696
Heavy Naphtha	0	5.824
Kerosene	0	9.5639
Gas Oil	2.5	7.7409
Residue (530^+)	85.59	63.4892

Table 1-6- temperature and pressure inside the tube furnace

Tube no.	Pressure (bar_g)	Temperature (°C)
86	9.54	456.32
85	9.57	456.91
84	9.60	453.80
83	9.92	452.87
82	10.23	451.91
81	10.53	450.85
80	10.82	449.85
79	11.10	448.83
78	11.38	447.79
77	11.65	446.72
76	11.91	445.77
75	12.16	444.63
74	12.41	443.44
73	12.65	441.89
72	12.90	440.67
71	13.14	432.29
70	13.38	430.76
69	13.61	429.23
68	13.85	427.69
67	14.08	426.16

66	14.31	424.62
65	14.53	423.08
64	14.76	421.54
63	14.98	420.00
62	15.20	418.46
61	15.42	416.91
60	15.64	415.37
59	15.85	413.82
58	16.07	412.27
57	16.28	410.71
56	16.49	409.16
55	16.70	407.60
54	16.91	406.04
53	17.12	404.48
52	17.33	402.92
51	17.53	401.35
50	17.73	399.79
49	17.94	398.22
48	18.14	396.65
47	18.34	395.07
46	18.54	393.50
45	18.73	391.92
44	18.93	390.34
43	19.13	388.76
42	19.32	387.18
41	19.51	385.59
40	19.70	384.01
39	19.89	382.42
38	20.08	384.83
37	20.20	379.24
36	20.39	381.65
35	20.51	380.06
34	20.63	378.47
33	20.74	376.88
32	20.86	375.28
31	20.99	373.43
30	21.12	371.57
29	21.25	369.72
28	21.38	367.86
27	21.51	365.99
26	21.65	364.13
25	21.78	362.26
24	21.91	360.38
23	22.04	358.51
22	22.17	356.63
21	22.30	354.74
20	22.43	352.86
19	22.56	350.97
18	22.69	349.08
17	22.82	347.18
16	22.95	345.28
15	23.08	343.37
14	23.21	341.47
13	23.34	339.56
12	23.47	337.64
11	23.60	335.72
10	23.73	333.80
9	23.86	331.88
8	23.99	329.95
7	24.12	328.01
6	24.25	326.08
5	24.38	324.14
4	24.51	322.19
3	24.64	320.24
2	24.77	318.29
1 (Soaker Drum)	24.90	316.33

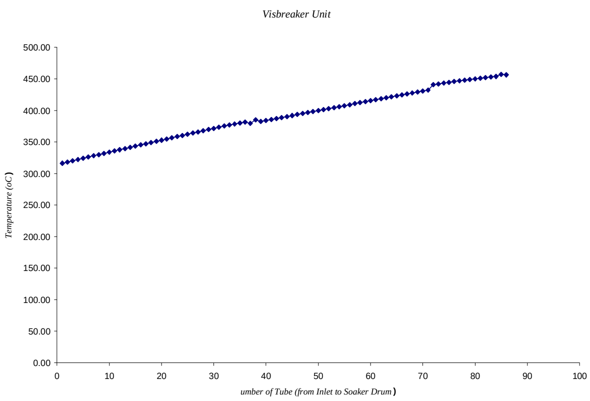

Figure 1.2 Changes in pressure in the tubes of the tube

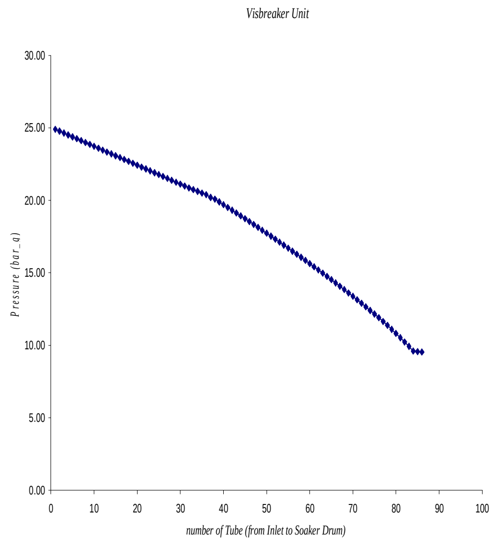

Figure 1.3 Temperature variation in terms of the number of tubes, pipes

Petro-Sim simulation unit

In this section, the simulation of breaking concentration (visbreaker) and then it will be reactor calibration. Open the application and Press Ctrl + N to create a new SBM adapted. Import and press the key components of refinery-default.cml option to select components and open match. Peng-Robinson thermodynamic model look like a little error in the determination of the thermodynamic properties of hydrocarbon mixtures. Enthalpy of the Lee-Kesler equation of state rather than is calculated. It leaves the Refinery Assay in there. (In addition to all the tabs in Aspen Hy sys) To define the petroleum cuts. (Information provided when defining cutting oil is like TBP ..., gravity, viscosity, curves the Assay say) To do this in Windows SBM tab Oil Manager to select and press Enter Oil Environment Checkbox (from the basic into the Oil Link). Page Oil Characterization opens. Refinery Assay import tab key to select and open ourselves and our Refinery -default.cml (This will Assay Matrix technology used in this paper) PR model for component-list 1 was chosen, it must be defined for Refinery -defult. So after opening Fluid-PKg key to our View, then Page Set up the component list selection options choose Refinery-default. We can cleanse the component-list-1. The Refinery Assay source Synthesize button calls back. Synthesize succeeded message that indicates the completion of the computation for defining Ok we feed it back to the Oil Characterization. After this step, SBM returned to the Enter Simulation Environment button to call up the environment to be simulated. F11 key to call up the object that represents the feed is created. Then we Assay Data compiled for the Load. (These data are stored in Oil.) To this page to a worksheet Composition, click on the Load a Refinery Assay into Stream. Load Refinery Assay Name window opens and the part we choose VB Feed and Select cuts are to be transmitted to the flow of information. With this combination of real and imaginary material (hypo) are defined in the worksheet Page Conditions, temperature, pressure and flow rate into the match. Flow calculations are done and seen in the Stream Type Fuel Oil words that represent the input data is correct.

Describe the process of reducing the viscosity of the oil refinery study as is clear from Figure PFD feeds into a number of pressure relief valve, exchangers, separators, and furnaces and heat flow out of the bottom of the distillation tower heat exchange units and pre-heated and the pressure also changes. To summarize this part of the simulation, regardless of the operating system and flows of food, water injection, steam injection oven Sucre after passing through the valve, the two-phase separators, furnaces and converters Network created. The kiln feed (stream 1), water for injection into the feed (stream 2), and steam for injection into the furnace outlet and inlet streams Soaker (the Steam) to create. View Streams of food, water and steam (temperature, pressure and flow rate) on the Worksheet tab page to enter our Condition. Since water vapor is mixed with the feed, its properties need to be defined based Assay matrix. In fact Worksheet Page Composition on Load a refinery Assay into Stream-click and select VB Feed in the Assay Name pick and choose Initialize Assay Properties Only check box to only Properties Assay for the flow to be transferred and the user is able blend of materials that flow.

CONCLUSION

Operational data collected in this study decreasing the viscosity of the refinery unit, the unit was simulated and then the furnace outlet temperature effect on the production of gasoline and fuel oil production was studied. Curves obtained from the sensitivity analysis performed for the products show the furnace outlet temperature increases the amount of gasoline produced and reduces the amount of fuel oil that due to limitations such as product quality and temperature of the furnace can be used for optimization. Considering that the simulation is based on the unit operating data of high accuracy, the results of the optimization of operating conditions, it will be a reliable and practical. The results are compared with the output of the unit, modeling, simulation and calibration verification is acceptable.

Suggestions

Due to variation of temperature on the quality and quantity of the products can be said increase oven temperature, amount of light products such as gasoline, increases and decreases heavy products such as fuel oil. On the other hand, the temperature increase will further reduce fuel oil viscosity. Due to the limitations of qualitative and quantitative the purpose of a small amount of product (oil furnace) temperature should be reduced as much as possible and if the goal is high quality product as possible to keep the temperature high.

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