

第13讲 Aspen软件中的换热器模型

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操作Heater

◇Heater模块在规定热力学状态下把多股入口物流混 合生成单股出口物流。
◇Heater模块包括:
〉Heaters(加热器)
>Coolers(冷却器)
>Valves(阀门)
>Pumps(泵)
>Compressors(压缩机)



Heater输入规定(1)

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- ◇允许组合:
 ●压力(或压降)和下列之一:
 >出口温度
 > 热负荷或入口热流股
 > 气化分率(1是露点,0是泡点)
- ≻温度变化
- > 过冷或过热度数



Heater输入规定(2)

6

●出口温度或温度变化和下列之一:

- ≻压力
- ▶热负荷
- ▶气化分率
- ●对于单相用压力(压降)和下列之一:
- ≻出口温度
- ▶热负荷或入口热流股
- ≻温度变化





✤HeatX能模拟如下管壳换热器类型:

>逆流和并流

➢弓形隔板TEMA E, F, G, H, J和X壳

≻圆形隔板TEMA E和F壳

>裸管和翅片管

▶全区域分析

▶传热和压降计算

≻显热、气泡状气化、凝结膜系数计算

> 内置的或用户定义的关联式



Simulation 1 - Aspen Plus V7.0 - aspenONE

File Edit View Data Tools Run Plot Library Window Costing Help

◇选择如下规定之一: ●传热面积和几何尺寸 ●换热负荷 ●热端或冷端出口物流: > 温度 > 温度变化 > 法近温度

▶过热/过冷度数

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▶气化分率



HeatX和Heater能计算热曲线(Hcurves)
对于Aspen Plus能生成的任何性质的各种独立
变量(通常负荷和温度)能够创建表格
这些表格能打印、绘制曲线或输出与其它换热器设计软件一起使用



- ❖【例1】比较用三种方法模拟用水冷却混合烃:
 - ▶一个是简捷HeatX
 - ➢一个是严格HeatX
 - ➤一个是连接一个热流股的两个Heater



※ 画出三个流程图:连接一个热流股的两个Heater、简捷HeatX和严格 HeatX



过程工程计算机应用基础

※单击NEXT,出现下图对话框,单击确定



※ 设置Setup选项。Valid phases(有效相)选Vapor-Liquid-Liquid(水和烃类两个液相)

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※ 添加新的物性集。点击New进入下一步

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※单击上图OK,出现下图窗口

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※创建第二个物点	生集,输入ID为DEWBUB,代表混合物的露
	Create new ID
	Enter ID: DEWBUB
	OK Cancel

※ Physical properties选TDEW和TBUB,分别代表混合物的 露点和泡点

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※ Setup/Report Options,点击Property Sets按扭添加物性集,这样结果报 告中会包括选择物性集的内容

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※添加新创建的两个物性集BETA和DEWBUB

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过程工程计算机应用基础

指定组分 ₂₂ ▶输入WATER(水)、BENZENE(苯)、STYRENE(苯乙 烯)和EB(乙苯)

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指定物性方法

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➤ 采用NRTL-RK物性方法

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指定HCLD-IN物流

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过湿工湿计算机应用基础



> 温度200℃、压力4 bar、流量10000 kg/h、质量百分组成: 50 wt%苯、20%苯乙烯、20%乙苯和10%水

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➤ 压降0,注意有效相为Vapor-Liquid-Liquid

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➤ 压降0、烃出口气化分率0,有效相为Vapor-Liquid-Liquid

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指定RHEATX模块(1)

> 选Shortcut(简捷法)、Countcurrent(逆流)、指定Hot stream outlet vapor fraction(热物流出口气化分率)为0

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指定RHEATX模块(2)

34

> U Methods (Calculation method for the overall heat transfer coefficient) 采用默认值Phase specfic values



指定SHEATX模块(1)

35

> 选Detailed(严格法)、热端Shell(壳程)、冷端Tube(管程)、
 Countcurrent(逆流)、指定Hot stream outlet vapor fraction(热物 流出口气化分率)为0





36

> U Methods采用默认值Exchanger geometry

Image: Simulation 1 - Aspen Plus V7.0 - aspenONE
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Block SHEATX (HeatX) Setup - Data Browser
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EDR AirCooled
EDR Plate Resu
EO Variables
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Film Coefficients (Calculation method for the hot and cold stream film coefficients) 采用默认值



设定Blocks/ SHEATX /geometry选项

38

> 右边的Shell页面中壳程直径1m,管程数为1

💽 Simulatio	on 1 - Aspen Plus V7	.0 - aspenONE		_ _ ×			
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设定Tubes页面

▶ 裸管300根,3m长、管心距31mm、内径21mm、外径25 mm

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Geometry	Pattern: Triangle Pitch: 0.031 meter	
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Cold Hcurves	Tube des	
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▶ 折流板5个、切削15%

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过程工程计算机应用基础



▶ 所有管嘴100 mm

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EDR Shell&Tub	
	16
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or Help, pre C:\AspenTech\Aspen Plus V7.0 CAP Required Input Complete	14

单击NEXT,出现下图对话框,点击确定

Required Input Complete



All required input is complete. You can run the simulation now, or you can enter more input. To enter more input, select Cancel, then select the options you want from the Data pulldown menu.

Run the simulation now?



X

过程工程计算机应用基础

打开控制面板,运行如下 (43)

💽 Simulation 1 - Aspen Plus V7.0 - aspenONE						
File Edit View Data Tools Run Library Window Costing Help						
Control Panel						
▶ ▷ N ■ Solve ▼ 🔣 🗹 🖾 🛛						
BLOCK BYPASSED RHEATX RHEATX HEATER-2 HEATER-1 Block: RHEATX MODE HEATER-1 Block: RHEATX MODE HEATER-2 HEATER-1 Block: RHEATX ** ERROR "COLD" STREAM IS HOTTER THAN "HOT" STREAM BLOCK BYPASSED ** ERROR "COLD" STREAM IS HOTTER THAN "HOT" STREAM BLOCK BYPASSED ** ERROR "COLD" STREAM IS HOTTER THAN "HOT" STREAM BLOCK BYPASSED ** WARNING INDEFENDENT VARIABLE "DUTY" AND PRESSURE DO NOT CHANGE. VALUES ARE CALCULATED ONLY AT INLET AND OUTLET.						
Simulation run c C:\AspenTech\Aspen Plus V7.0 CAP Results Available with Errors						

过程工程计算机应用基础

HEATER-1的结果

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Results Ner aug: U Lical/nr V					
EO Va Istiliquid / Total liquid: 1					
EO In; Pressure-drop correlation parameter: U					
Spect					
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For Help, pre: C:\AspenTech\Aspen Plus V7.0 CAP Results Available with Errors					

HEATER-2的结果

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- D 2 - <u>3</u>	1
Block HEATER-2 (Heater) Results - Data Browser	
Report C Summary Balance Phase Equilibrium Utility Usage	
Components Block results summary	
Cutlet temperature: 119.485575 C ▼	
Streams Outlet pressure: 4 bar	
Blocks Vapor fraction: 0	
HEATER- Heat duty: 18.290833 Gcal/hr 💌	
HEATER- Net duty: 18.290833 Gcal/hr 💌	
V Inpu 1st liquid / Total liquid: 0.67673143	
Hcur Pressure-drop correlation parameter: 0	
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过程工程计算机应用基础



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Cold Hcurves	Summary Balanc	e Exchange	er Details 🏻	Pres Drop/V	elocities Zones	Utility Usage	
User Subroutines							
Dynamic	Heatx results	In	let	Out	let		
Block Options	Hot stream:	RCLD-IN		RCLD-OUT			
Thermal Results	Temperature:	20	c 🔻	20	C •		
Geometry Results	Pressure:	10	- bar ▼	10	bar 🗸		
EDR Shell&Tube Resul	Vapor fraction:			0			
EDR AirCooled Result:	Cold stream:	BHOT-IN		ре ВНОТ-ОПТ			
EDR Plate Results	Temperature:	200	r -	200			
EO Variables	Pressure:	4	bar 💌	4	bar v		
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SHEATX的结果

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	Dyna –	Temperature C	200.0	20.0	200.0	20.0		
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<mark>X</mark>	Geo –	Mole Flow kmol/hr	157.559	3330.506	157.559	3330.506	1	
<mark>-</mark>	EDR -	Mass Flow kg/hr	10000.000	60000.000	10000.000	60000.000	1	
<mark>×</mark>	EDR -	Volume Flow cum/hr	1488.156	60.074	1488.156	60.074	1	
<mark>X</mark>	EDR -	Enthalpy MMkcal/hr	-0.521	-227.518	-0.521	-227.518	1	
×	EO \ -	Bubble Temp C	119.485	179.976	119.485	179.976	1	
S	EO I	Dew Temp C	150.674	179.977	150.674	179.977		
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过暹工暹计算机应用基础





过程工程计算机应用基础



※ 换热器是化学工业及其他过程工业的通用设备,其设备投资占设备总投资的 0.3-0.4。换热器类型多种多样,但以管 壳式换热器应用最广。此类换热器通过 管壁进行传热,结构简单,换热负荷大, 下面以管壳式换热器为例,说明利用 Aspen进行换热器设计的基本过程。



※将5t/h常温常压下的苯(0.44,质量分数)的甲苯混合 液加热到泡点,求热负荷及泡点温度,如图搭建流程图:





※输入组分苯与甲苯,如图:

🥑 Simulation 1 - Aspen Plus V	7.0 - aspenONE - [Components Specifications - Data Browser]						
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	Selection Petroleum Nonconventional JDatabanks						
SI-CBAR							
US-1	Component ID Tupe Component name Formula						
Custom Units	BENZE-01 Conventional BENZENE C6H6						
Report Options	TOLUE-01 Conventional TOLUENE C7H8						
Components							
Specifications							
Assay/Blend							
Light-End Prope							
Petro Character							
Pseudocompon							
Attr-Comps							
Henry Comps							
Come Comes							
Comp-Groups							
Comp-Lists	Find Liec Wizard User Defined Reorder Review						
Attr Scaling							
Attr-scaling	Lomponent LD. If data are to be retrieved from databanks, enter either Component Name or Formula. See Help.						
Fas Hala assas E							
For Help, press F.	C:\AspenTech\Aspen Plus V7.0 CAP Required input incomplete						



※选择IDEAL热力学方法,如图:

🥑 Simulation 1 - Aspen Plus V7	.0 - aspenONE - [Properties Specifications - Data Browser]					
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Attr-Comps 🔺 🗸	Global Flowsheet Sections Referenced					
Henry Comps Moisture Comps UNIFAC Groups	Property methods & models Property method:					
Comp-Groups	Base method: DEAL Modify property models					
Comp-Lists	Henry components: Vapor EOS: ESIG -					
Polymers	Petroleum calculation options Data set: 1					
Attr-Scaling	Free-water method: STEAM-TA 🗨					
Properties	Water solubility: 3 🗨 Data set: 1 🛫					
	Electrolyte calculation options Liquid enthalpy: HLMX82 Chemistry ID: Heat of mixing					
Molecular Structure	Use true-components					
Data						
Prop-Sets						
CAPE-OPEN Packag	deal property method. Uses both Raoult's law and Henry's law.					
Flowsheet 👻						
For Help, press F:	C:\AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete					



※输入进料物流1的参数,如图:

🥑 Simulation 1 - Aspen Plus V7	7.0 - aspenONE - [Stream 1 (MATERIAL) Input - Data Browser]
💽 File Edit View Data T	ools Run Plot Library Window Costing Help 📃 🖅 🗙
🗸 Input 🗨 🖭	
Attr-Scaling	Specifications Flash Options PSD Component Attr. EO Options Costing
Properties	
	Substream name: MIXED Ref Temperature
🔂 Property Methods	State variables Composition
Estimation	Temperature Mass-Frac 🗸
Molecular Structure	25 C Component Value
Parameters	BENZE-01 0 44
🛅 Data	Pressure
Analysis	
Prop-Sets	
Advanced	Total flow: Mass
CAPE-OPEN Packag	5 tons/hr
Flowsheet	
Streams	Solvent:
1	
Input	
Results	Total: 1
EO Variables	
Custom Stream	
2 ·	
For Help, press FI	C:\AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete



※在加热器模块对话框中选择压力及汽化分率,如图:

C Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (Heater) Input - Data Browser]
I File Edit View Data Tools Run Plot Library Window Costing Help ㅋ ×
▋
Advanced Aspecifications Flash Options Utility
CAPE-OPEN Packag
Flowsheet
Streams Tessure I alm
1 Yapor fraction U
- 2 Valid phases
Blocks
B1
Input
- <u></u> Hcurves
Dynamic
- 🕖 Block Options
Results
EO Variables
O Input
🥑 Spec Groups
Ports
Stream Results
Custom Stream Lets you type the pressure. Absolute units: outlet pressure if value > 0; pressure drop if value
Utilities
For Help, press F1 C:\AspenTech\Aspen Plus V7.0 CAP Required Input Complete

过程工程计算机应用基础







※加热器计算结果,如图:

C Simulation 1 - Aspen Plus V7.0 - aspenONE - (Block B1 (Heater) Results - Data Browser) □ × □ File Edit View Data Tools Run Plot Library Window Costing Help □ # × □ # # ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
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Components Block results summary Properties Outlet temperature: Plowsheet 92.7085361
Image: Constraint of the sum of the
✓ Input Net duly: 159136.838 ✓ Hcurvet 1st liquid / Total liquid: 1 ✓ Dynami Pressure-drop correlation parameter: 0
- ✓ Block C - ✓ Results - ✓ EO Var - ✓ EO Inn
V Sucan Custom Utilities Reactions ▼
For Help, press F1 C:\AspenTech\Aspen Plus V7.0 CAP Results Available //



※物流的温度、压力已显示,如图:





※搭建流程图,如图:





※输入组分苯、甲苯、水,如图:

🥑 Simulation 1 - Aspen Plus V7	.0 - aspenONE - [Components - Data Browser]		
🔝 File Edit View Data To	ools Run Plot Library Window Costing Help		
	।		
Components 🗨 🛅			
🕀 🔂 Setup	Selection Petroleum Nonconventional VDatabanks		
Components	- Define components		
Specification	Component ID Type Component name Formula		
Light-End Pr	BENZE-01 Conventional BENZENE C6H6		
Eight-Eid P	TOLUE-01 Conventional TOLUENE C7H8		
	WATER Conventional WATER H20		
Attr-Comps	*		
Henry Comr			
Moisture Cc			
UNIFAC Grc			
Comp-Grou			
🕀 🔂 Comp-Lists			
🕀 🛅 Polymers			
Attr-Scaling			
🗄 🔂 Properties			
Flowsheet	Howsheet Find Elec Wizard User Defined Reorder Review		
E Streams			
E 2 .			
For Help, press F:	C:\AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete		



※输入进料物流1的参数,如图:





※输入进料物流3的参数,如图:

Circulation 1 Arran Dive V/7.0 Arran ONE (Chu	
Sinulation 1 - Aspen Plus V7.0 - aspenore - [stre	Mindaw Casting Using
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🕀 🔂 Comp-Lists 📥 🗸 Specifications Flash	Options PSD Component Attr. EO Options Costing
Polymers	
Attr-Scaling Substream name:	IXED Ref Temperature
E State variables	Composition
Elowsheet	▼ Mass-Frac ▼
🗄 🗹 Streams 🛛 100 C	Component Value
	BENZE-01 0
1 Vapor fraction	
j 🔁 🖓 3	WATER 1
Results Total flow: Mass	▼
EO Var 2 tons/hr	▼
Custom	
E 4 Solvent:	
Elocks	
Utilities	
E Reactions	Total: 1
E Convergence	
Elowsheeting Op	ponent flow, fraction or concentration. See Help.
🗄 🛅 Model Analysis 1 🗸	
For Help, press F: C:\	AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete



※选择简捷计算和设计选项,并在换热器规定中指定 物流出口温度为50℃,如图:

🥑 Simulation 1 - Aspen Plus	V7.0 - aspenONE - [Block B1 (HeatX) Setup - Data Browser]
🔝 File Edit View Data	Tools Run Plot Library Window Costing Help
	\$ \? <mark>⊠~^</mark> &\\$~~?~ № ▶ ▷ ዞ ⊠ ⊠
44Q 🛛 🖉 🖉 💆	
Setup 💌 🛄	
🗎 🖻 🔂 📥	Specifications LMTD Pressure Drop JU Methods Film Coefficients Utilities
🍼 🍼 Setup	- Calculation - Flow arrangement
	Shortcut C Detailed Hor Gridgenorit
🚽 🗸 EDR Or	C Shell&Tube
EDR Br	C AirCooled No. shells in series: 1
Geome	C Plate
Hot Ho	C Hetran
Cold H	C Aerotran Transfer UA Type: Design
User SL	C TASC to shortcut
Dynami	Exchanger Type: Heat exchanger
Вюск С	Exchanger specification
Geome	Specification: Hot stream outlet temperature
	Value: 50 C
	Exchanger area:
	Constant UA:
EO Var	Minimum temperature approach: 1 K
🗸 EO Inpi	
💋 Spec G	
Ports 🗸	
For Help, press F1	C:\AspenTech\Aspen Plus V7.0 CAP Input Changed



※在此标签中指定总传热系数为定值,并输入其值 为500W/(M²k),如图:





💽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Control Panel]
🔝 File Edit View Data Tools Run Library Window Costing Help
□≥∎ @& ®® № <mark>□~1</mark> \$\$\$44 № □ ▶ ▶ ₩ = ≅ ⊠ ⊠ ● ○ ● Ø
▶ ▷ H ■ Solve ▼ ☑
Calculation Sequen ->Processing input specifications
B1 Flowsheet Analysis :
COMPUTATION ORDER FOR THE FLOWSHEET:
->Calculations begin
Block: B1 Model: HEATX
->Generating block results
Block: B1 Model: HEATX
->Simulation calculations completed
*** No Errors or Warnings Generated ***
More
All blocks have been executed
Simulation run completed C:\AspenTech\Aspen Plus V7.0 CAP Results Available



※点击B1模块中的Thermal Results来查看热负荷,混 合液的出口温度,如图:

🥑 Simulation 1 - Aspen Plus V7.0 - aspenONI	E - [Block B1 (HeatX) Thermal Results - Data Browser]
🔝 File Edit View Data Tools Run P	lot Library Window Costing Help _ 문자
DFI 50 DC 1	'‱≒≪∞™ ः ▶▷ዞ = ⊠ ⊠ ●○● ∞
🗸 Thermal Results 🕒 🖻	$\bullet \Leftrightarrow \bullet {\leftarrow} \bullet \bullet$
EDR Br 📥 Summary Bal	ance Exchanger Details Pres Drop/Velocities Zones Utility Usage
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Hot Hci	Inlet Outlet
Cold H Hot stream:	3 4
User SL Temperature	100.000006 C 🗨 50.0000061 C 💌
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Block C Vapor fractio	n: 0 0
Thermal Results	1 2
Geome Temperature	25.0000061 C V 72.0416391 C V
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EO Inpu	107.099272 kw 👻
Spec G	
Ports	
Stream	
Custom	
Utilities	
🖶 📩 Reactions 🖃	
For Help, press F1	C:\AspenTech\Aspen Plus V7.0 CAP Results Available



※点击Exchanger Details看到所需的换热器面积为 8.0m²,如图:

🢽 Simulation 1 - Aspen Plus V	7.0 - aspenONE - [Block B1 (HeatX) Thermal Results - Data Browser]			
🔝 File Edit View Data T	ools Run Plot Library Window Costing Help문 🗙			
	K Instra M M II >> M ■ M M N OO 00 00			
🔽 Thermal Results 🛛 💌 🛅				
EDR Br 🔺	Summary Balance Exchanger Details Pres Drop/Velocities Zones Utility Usage			
	- Evolvander detaile			
Hot Hcı				
Cold H	Calculated heat duty:			
	Required exchanger area: 8.0977482 sqm			
💛 Dynami	Actual exchanger area: 8.0977482 sqm			
	Percent over (under) design: 0			
Therm:	Average U (Dirty): 500 Watt/sqm-K			
Geome	Average U (Clean):			
EDR Sh	UA: 4048.8741 J/sec-K			
EDR Air	LMTD (Corrected): 26.4516169 K			
EDR Pla	LMTD correction factor: 1			
EO Var	Thermal effectiveness:			
	Number of transfer units:			
Dorte	Number of shalls in series: 1			
Stream				
Custor:	INumber of shells in parallel			
Utilities				
E Reactions				
For Help, press F1	C:\AspenTech\Aspen Plus V7.0 CAP Results Available			

更改换热器的计算方式(1)

※ 计算方式改为严格计算,并指定热物流在壳 程流动,计算选项为模拟,如图:

💽 Simulation 1 - Asp	n Plus V7.0 - aspenONE - [Block B1 (HeatX) - Data Browser]
File Edit View	Data Tools Run Plot Library Window Costing Help 문
	®® ♥ II~*&\$\$~~~ ♥ II >> ♥ ■ II ● O● Ø
🔯 B1	
🖨 🖄 B1	▲ Specifications LMTD Pressure Drop V Methods Film Coefficients Utilities
Se Op Op Op Op Op Op Op Op Op Op Op Op Op	Ip Calculation Flow arrangement Ior Shortcut Detailed Shortcut Detailed Hot fluid: IBr AirCooled Flow direction: Countercurrent No. shells in series: I Calculate number of shells Calculate number of shells Hci Aerotran Transfer UA Chetran Calculate number of shells Chetran Exchanger Type: Exchanger specification Exchanger Type: Walue: 50 C Short Sagm V
	Air Constant UA: J/sec-K 👻
	Ninimum temperature approach: 1 K ▼
	Van
SP SP	e w
For Help, press F:	C:\AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete



※在此标签中指定总传热系数的计算方式为 通过换热器结构进行计算,如图:

🢽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) - Data Browser]
📰 File Edit View Data Tools Run Plot Library Window Costing Help 📃 🗗 🗙
B1 🖌 Vspecifications LMTD Pressure Drop VU Methods VFilm Coefficients Utilities
- 🕖 Setup
Ø Option:
V EDR OF
EDR Br
Geome C Phase specific values
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User subroutine
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Geome Conscion actor.
Spec o calculate U from exchanger geometry.
ror heip, press r. C:\Aspen i ecn\Aspen Plus V7.0 [CAP] Required input incomplete



※在壳程标签下,在壳内径中输入500mm,如图:

🢽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) Geometry - Data Browser]
🔝 File Edit View Data Tools Run Plot Library Window Costing Help 🗕 🖪 🚬
D≊₽ @& №® № <mark> </mark>
🖕 Geometry 🔹 🖻 🖹 US-1 🔹 🗢 ➡ <<< Ali 🔹 >> 🗖 🕲 🚳 ⋗ 🖉 🖉 🗙
B1 Shell Grubes Tube Fins Grubes Nozzles
Shell side parameters
Option: TEMA shell type: E - One pass shell
EDR OF No. of tube passes:
Exchanger orientation: Horizontal
Second Number of sealing strip pairs:
Cold H
Control Inside shell diameter: 500 mm
Dynami Shell to bundle clearance: meter
Block C Crossflow tubeside mixing:
Therma Crossflow shellside mixing:
Geome Number of shells in series:
EDR Sh- Number of shells in parallel:
EO Var
🕑 EO Inpi
Spec G Direction of Tubeside Flow is not allowed unless Exchanger Orientation=Vertical.
Ports 🔽
For Help, press F: C:\AspenTech\Aspen Plus V7.0 CAP Required Input Incomplete



※在管程标签下,输入管数100,管长6m,相邻管的 中心距30mm,管外径25mm,管壁厚2mm,如图:

🥑 Simulation 1 - Aspe	en Plus V7.0 - aspenONE -	[Block B1 (HeatX) Geometry - Data Brows	ier] _ 🔲 🗙	
🔝 File Edit View	Data Tools Run Plot	Library Window Costing Help	_ 8 ×	
	BB 🕅 🖬 🖬 📢	Musika N>	- 🗷 🗹 💽 🔘	
Geometry	🔹 🛅 🖹 US-1 💽	←→ << AI → >> <u>□</u> 做		
🖻 🔄 B1	▲ ✓Shell ✓Tubes	Tube Fins 🛛 🗢 Baffles 🗢 Nozzles		
Setu Opt EDR	tion: R Or	C Finned tubes		
EDR	R Br Tube layout			
Geo	ome 🛛 🛛 Total number: 🥤	TUU Length: 6	meter 🗨	
	Hci Pattern:	Triangle 💌 Pitch: 30	mm	
Cold	d Hi Material:	Carbon Steel Conductivity:	Watt/m-K 👻	
🚽 🗸 Use	er Su		,	
🚽 🕖 Dyn	nami	C N 1 1		
	ck C	(Nominal		
	rma	meter Viameter:	<u> </u>	
- Geo	ome Outer diameter:	25 mm gauge (BWG):	<u> </u>	
EDR	Sh Tube thickness	2 mm 💌		
	RAir			
EDR	R Pla			
EO EO	Var			
	Inp			
Spe	CG Actual tube size.			
Port	ts 💌			
For Help, press F:		C:\AspenTech\Aspen Plus V7.0 CAP	Required Input Incomplete	



※在<mark>折流板</mark>标签下,输入折流板数23,折流板切割分 率0.2,如图:

💽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) Geometry - Data Browser]				
💽 File Edit View	v Data Too	ls Run Plot Library Window Costing Help	_ 8 ×	
Dee sr 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
Geometry ▼ 🖻 🖹 US-1 ▼ 🗢 → << All ▼ >> 🔲 🕲 🛞 📂 🖉 🖉 ×				
🖹 🗁 🎦 B1	<u> </u>	Shell √Tubes Tube Fins VBaffles ↔ Nozzles		
	Setup Ontion:	Baffle type		
	DR Or	Segmental baffle C Rod baffle		
	DR Br	Segmental baffle		
	Seome	lo. of baffles, all passes: 23		
		affle cut (fraction of shell diameter): 0.2		
		Tabecheet to 1st ballio spacing.		
) ser st	Baffle to baffle spacing: meter		
	Block C	Last baffle to tubesheet spacing: meter		
	herma	Shell-Baffle clearance: meter		
- 🗖 G	Geome	Tube-Baffle clearance: meter 💌		
	DR Sh	✓ Tubes in baffle window		
	DR Air			
	DR Pla			
	O Vari			
	O Inpi			
🚽 🗸 S	Spec G The	spacing between the tubesheet and the first baffle.		
P	Ports 👻			
For Help, press F:		C:\AspenTech\Aspen Plus V7.0 CAP Required Input Inco	omplete 🦷	

过湿工湿计算机应用基础



※在<mark>管嘴</mark>标签下,输入壳程管嘴直径及管程管嘴直径, 如图:

🢽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) Geometry - Data Browser]				
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Geometry ▼ ▲ → ≪ AII ▼ >> □ △ △ ● ×				
B1				
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CDB Or Inlet nozzle diameter: 200 mm ▼				
Outlet nozzle diameter: 200 mm V				
Geome				
Hot Hci				
Cold H	I			
User St User St Utiet nozzle diameter: 32 mm	I			
Dynami Dynami				
Block C				
Therma				
Geome Geome				
EDR Sh-				
EO Van				
For Help, press F1	red 4			


💽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Control Panel]			
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▶ ▷ K ■ Solve ▼ 🗰 🖾 🖾 ✓			
Calculation Sequen *** No Errors or Warnings Generated ***			
B1 << Problem specifications modified 14:34:38 Sat Feb 23, 2013>>			
->Processing input specifications			
->Finished processing new specifications			
->Calculations begin			
Block: B1 Model: HEATX			
->Simulation calculations completed			
*** No Errors or Warnings Generated ***			
Simulation run completed C() AspenTech/Aspen Plus V7.0 CAP Results Available			
Simulation fun completed			



※ 热物流出口温度为71.3℃,冷物流出口温度为53.3℃,如图:

💽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) Thermal Results - Data Browser]				
🔝 File Edit View Data	Tools Run Plot Library Window Costing Help			
	\$ \$\$ <mark> <mark> </mark></mark>			
🔽 Thermal Results 🛛 💌 🖻	$\blacksquare \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet $			
🖹 🖻 🛃 🔺	Summary Balance Exchanger Details Pres Drop/Velocities Zones Utility Usage			
	Inlet Outlet			
🚽 🕖 EDR Or	Hot stream: 3 4			
EDR Br	Temperature: 100.000006 C - 71.3609901 C -			
🧭 🧭 Geome	Pressure: 0.99936373 atm 🗸 0.99930916 atm 👻			
Hot Hci	Vapor fraction: 0 0			
Cold H	Cold stream: 1 2			
User Su	Temperature: 25.0000061 C - 53.3727901 C -			
Dynami	Pressure: 0.99999999 atm V 0.97724249 atm V			
Block C	Vapor fraction: 0 0			
Thermal Re				
Geome	Heat duty: 62.732367 kW -			
EDIC FIE				
EO Inpi				
Spec G				
Ports V				
For Help, press F1	II C:\AspenTech\Aspen Plus V7.0 CAP Results Available			



※计算选项为核算Rating,并规定热物流的 出口温度为50℃,如图:

C Simulation 1 - Aspen Plus V7.0 - aspenONE - [Block B1 (HeatX) Setup - Data Browser]
File Edit View Data Tools Run Plot Library Window Costing Help
🖻 🛅 B1 🔺 Specifications LMTD Pressure Drop JU Methods Film Coefficients Utilities
Option: Calculation Flow arrangement Option: C BD Or
C Shell&Tube Flow direction: Countercurrent ▼ M C AirCooled No. shells in series: 1
Calculate number of shells C Hetran C Calculate number of shells C Calcul
Viser Su C TASC C TA
Block C Exchanger specification
A Therma Specification: Hot stream outlet temperature Geome Volum: F0 C
Evolution and the second secon
Constant UA: J/sec-K ▼ Constant UA: J/sec-K ▼ Minimum temperature approach: 1 K ▼
V EO Var

For Help, press F1 C:\AspenTech\Aspen Plus V7.0 CAP Input Changed 📈



💽 Simulation 1 - Aspen Plus V7.0 - aspenONE - [Control Panel]
📰 File Edit View Data Tools Run Library Window Costing Help 📃 🖪 🗶
D≊∎ @& ™® № <mark>™~‰≒∢∞ №</mark> ™ ▶▶ ⋈ = ℝ थ № 00 0
▶ ▷ K ■ Solve ▼ 課 図 照マポケ
E- Calculation Sequen *** No Errors or Warnings Generated ***
B1 << Problem specifications modified 14:36:01 Sat Feb 23, 2013>>
->Processing input specifications
->Finished processing new specifications
->Calculations begin
Block: B1 Model: HEATX
->Simulation calculations completed
*** No Errors or Warnings Generated ***
Moreš
All blocks have been executed
Simulation run completed C:\AspenTech\Aspen Plus V7.0 CAP Results Available



※ 热物流出口温度为50℃,冷物流出口温度为72 ℃, 如图:

🢽 Simulation 1 - Aspen Plus V	7.0 - aspenONE - [Block B1 (HeatX) Thermal Results - Data Browser]
🔝 File Edit View Data T	Fools Run Plot Library Window Costing Help
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	Hot stream: 3
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	Pressure: 0.99936373 atm 💌 0.99930863 atm 💌
	Vapor fraction: 0 0
	Cold stream: 1 2
Oser st	Temperature: 25.0000061 C 🗸 72.0416341)
A Block C	Pressure: 0.99999999 atm 💌 0.9767277 atm 💌
Thermal Res	Vapor fraction: 0 0
Geome	
EDR Sh	Heat duty: 107.099272 kW
EDR Air	
EDR Pla	
EO Var	
💋 EO Inpi	
💋 Spec G	
Ports 🚽	
For Help, press F1	C:\AspenTech\Aspen Plus V7.0 CAP Results Available

查看模拟结果(2) 78

※换热所需面积为142m²,大于实际面积47.1m², 所以该换热器不能使热水出口温度为50 ℃, 如图:

Simulation 1 - Aspen Plus	77.0 - aspenONE - [Block B1 (HeatX) Thermal Results - Data Browser]
🔽 Thermal Results 🛛 💌 🛅	■ • • • · · · · · · · · · · · · · · · · ·
🖻 🔂 🕒 🔺	Summary Balance Exchanger Details Pres Drop/Velocities Zones Utility Usage
Setup	Exchanger details
	Calculated heat duty: 107.099272 kw
💽 EDR Br	Required exchanger area: 142.763801 sqm
	Actual exchanger area: 47.1238911 sqm
Hot Ho	Percent over (under) design: +202.95419
Cold H	Average U (Dirty): 28.3606511 Watt/sgm-K
User Si	Average U (Clean): 28.3606511 Watt/sgm-K
Uynami	UA: 4048.87435 J/sec-K
Thorm	▶ LMTD (Corrected): 26.4516153 C
Geome	LMTD correction factor: 1
EDR Sh	Thermal effectiveness:
EDR Air	Number of transfer units: 1.8902435
🗸 EDR Pla	Number of shells in series:
EO Var	Number of shells in parallel: 1
🍼 🍼 Spec G	
Ports 🔻	
For Help, press F1	C:\AspenTech\Aspen Plus V7.0 CAP Results Available



※管壳式换热器的设计过程是一个需要反复迭代的过程。 因此传热系数和压降取决于许多几何因数,包括壳体 和管子的直径、管子的长度、管子的排列方式、挡板 形式和板间距、管程数及壳程数等,所有这些最初都 是未知的,所以整个的设计过程将是一个试差过程。

设计换热器结构(1) 80

※运行Aspen Exchanger Design & Rating软件,新建一个管 壳式换热器设计案例,如图:





※点击上图的Ok,出现下图窗口并点击 Shell&Tube,如图:

Image: Subtitied - Aspen Exchanger Design & Rating V7.0 - aspenONE - [Shell&Tube] □ × Image: File Edit Run Tools View Window Help □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenONE - [Shell&Tube] □ ≠ × Image: Design & Rating V7.0 - aspenDesign & Rating V7.0 - aspenDespenDesign & Rating V7.0 - aspenDesign & Ra
Efile Edit Run Tools View Window Help □ ☞ ■ ● ※ ● ● ☆ ☆ ☆ 範 ■ 2 ☆ & \$ 東 ● ☆ ☆ → Q Q ☆ № ※ ShelkTube E ■ US 2 ↔ → ≪ >> N→
□ ☞ 묘 ● ※ ☜ 電 快 藝 ···· 会 鮿 雛 22 & \$ 東 @ 快 会 ▶ @ Q 经 № № 図 Shell&Tube ▼ 12 〒 118 US ▼ (23 ← → ≪ ≫ №
2 Shell&Tube I I III IIII US IIII ↓ ↔ N→
Shell&Tube Status
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Hesuits Hesuits Complete
For help, press F1. INS 2013/2/23 17:01



※点击上图的Input/Problem Definition/Process Data出现 下图窗口,如图:

Image: Source of the second	Untitled - Aspen Exchanger De File Edit Run Tools Vie	ssign & Rating V7.0 - aspenONE - [Shell&Tube.Input.Problem Definition.Process Data] w Window Help	_
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Process Data Process Data	Nput Note: Application Options	Hot Stream (1) Cold Stream (2) Shell Side Tube Side	
↓ 14%5 ↑ 0.5%	A Troce y Dea Troce y Dea A Troce y Dea Control (1) Control (1) Control (1) Control (1) Angen Option Result	In Out In Out Mass flow rate (btal) In/F In/F In/F Tenperature In/F In/F In/F Operating pressure (abcold) In/F In/F In/F Pressure al figlid surface in current In/F In/F Heat load In/F In/F Adjuit if overspecified In/F In/F Densine depressure drop In/F In/F Albouche pressure drop In/F In/F Albouche pressure drop In/F In/F Fording resistance In/F.Y.F.BTU In/F.Y.F.BTU	
↓ 14%5 ↑ 0.5%			
			↓ 1.4K/S ↑ 0.5K/
			l





设计换热器结构(5)

84

※输入热物流的名称为hot water,进口温度、出口温度、操作压力;输入冷物流的名称为ben-tolu及质量流量、进口温度、出口温度、操作压力,如图:

to Untitled - Aspen Exchanger	Design & Rating V7.0 - aspenONE - [Shell&Tube.Input.Problem Definition.Process Data]	_ _ _ _ _
File Edit Kun Tools V		<u>_ 8' ×</u>
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M Shell&Tube	✓ Process Data	
E-M Problem Definition	Hot Stream (1) Cold Stream (2)	
Headings/Remarks	Shell Side Tube Side	
Application Options	Fluid name hot water ben-tolu	
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Exchanger Geometry	Mare Boy rate Brital	
Construction Specificatio		
E- Results		
	Vapor mass fraction	
	Operating pressure (absolute) bar 🖌 1 89 1 89	
	Pressure at liquid surface in column	
	Heat exchanged	
	Heat 1992 A Heat 1992 A	
	Estimated pressure drop has v 11	
	Allowable pressure drop base 11 20684	
	The absolute operating pressure on the cold side at the cullet.	↓ 0K/S ↑ 0K/S (5)
	1	
For help, press F1.		INS 2013/2/23 16:55
1		



※点击Shell&Tube/Input/property Data/Hot Stream Compositions,出现下图对话框如图:

📩 Untitled - Aspen Exchanger I	Design & Rating V7.0 - aspenONE -	Shell&Tube.Input.Property Data.Hot Stream (1) Composition]	_ _
File Edit Run Tools V	iew Window Help		_ 8 ×
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Hot Streem (1) Composition 💌	💼 🏤 US 🔹 🔛 🖨 ⇒	« » N•	
ShellETube	X Composition V Property Methods	✓ Interaction Parameters ✓ NRTL ✓ Uniquac	
E-M Input	Physical property package	P.WC	
Headings/Remarks	Hat side annual for annu Kastian	ásnen Proteites	
Application Options	The are composition specification	COM Themo	
Process Data	Components	User specified properties pe	
Hot Stream (1) Cc	1		
Hot Stream (1) Prope	2		
Cold Stream [2] Cold	3		
Exchanger Geometry	4		
E Construction Specificatio	5		
Bandr	6		
	7		
	8		
	9		
	10		
	Search Databank	Delete Row Inset Row	
	The program defaults to the B-JAC databank	The Aspen PLUS databank requires an APPDF file with stream information.	+ ok/s ↑ ok/s (6)
			R = R
For help, press F1.			INS 2013/2/23 17:05

设计换热器结构(7) 86

※点击上图的Search Databank按钮, 弹出下图对话框, 在此对话框中查找所需组分, 如图:





※指定物质水,如图:

Search Chemical Components			×
1. Type a few letters of the word you	u're looking for:	Search By	
water		🙀 Name	•
		Databank	
2. Click items listed below and then	click Add:	BJAC and Stand	lard 💌
Name	Formula	Molecular Weight	
Vinyl chloride	C2H3CL	62.5	
Vinyl fluoride	C2H3F	46	
Vinyl formate	C3H4O2	72.06	
Vinyl propionate	C5H8O2	100.1	
Vinylacetonitrile	C4H5N	67.09	
Vinylacetylene	C4H4	52.08	
Vinylcyclohexene	C8H12	108.2	
Vinylidene chloride	C2H2CL2	96.95	
Water	H20	18.01	-
Add		<u>R</u> emove	
Selected components for hot side:	1		
Name	Formula	Molecular Weight	
		OK	Cancel



※点击上图的Add,指定给组分已被添加,如图:

Search Chemical Components			×
1. Type a few letters of the word you	Search By	1	
water	🙀 Name 💌		
2. Click items listed below and then c	slick Add:	Databank BJAC and Standard ▼	
Name	Formula	Molecular Weight	7
Vinyl chloride Vinyl fluoride Vinyl formate Vinyl formate Vinylacetylene Vinylacetylene Vinyldcechoride Water <u>Add</u>	C2H3CL C2H3F C3H402 C5H802 C4H5N C4H4 C8H12 C2H2CL2 H20	62.5 46 72.06 100.1 67.09 52.08 108.2 96.95 18.01	
Name	Formula	Molecular Weight	-
Water	H20	18.01	-
		OK Cancel	

设计换热器结构(10)

※同理指定物质甲苯,如图:

arch Chemical Componer	nts			
. Type a few letters of the word	d you're looking for:	S	earch By	
toluene	- A	lame	-	
2. Click items listed below and t	hen click Add:	D	atabank 3JAC and Stanc	lard 💌
Name	Formula	Molecu	lar Weight	
Thiodiglycol Thionyl chloride Thiophene Thiourea Titanium dioxide Titanium tetrachloride Titanium trichloride p-Tolualdehyde Tolualdehyde Selected components for hot s	C4H1002S CL20S C4H4S CH4N2S 02TI CL4TI CL3TI C8H80 C7H8 C7H8	122.2 119 84.14 76.12 79.88 189.7 154.2 120.2 92.13 8 21.12 Remove		-
Name	Formula	Molecu	lar Weight	
Water	H20	18.01		
		0	IK	Cancel



※点击上图的Add,指定给组分已被添加,如图:

benzene	🔏 Name	•	
		Databank	
Click items listed below and	then click Add:	B-JAC and	d Standard 💌
Name	Formula	Molecular Weigh	nt 🔺
Barium carbonate Benzaldehyde	CBAO3 C7H6O	197.3 106.1	_
Benzene	C6H6	78.1	
1,2-Benzenediol	C6H6O2	110.1	
1,3-Benzenediol	C6H6O2	110.1	
1,2,3-Benzenetriol	C6H6U3	126.1	
Benzoic acio Benzonitrile	C7H5UZ	122.1	
Benzophenone	C13H100	182.2	-
	Add	Remove	
Gelected components for ho	t side:		
Name	Formula	Molecular Weigł	nt
Water	H20	18.01	
Toluene	C7H8	92.13	

设计换热器结构(12)

※同理指定物质苯,如图:

arch Chemical Component	ts			
. Type a few letters of the word	you're looking for:	[Search By	
benzene	a	Name	-	
			Databank	
2. Click items listed below and th	en click Add:		B-JAC and Standar	d 🔻
Name	Formula	Mole	ecular Weight	
Barium carbonate	CBA03	197.	3	_
Benzaldehyde	C7H60	106.	1	
Benzene	C6H6	78.1		
1,2-Benzenediol	C6H6O2	110.	1	
1,3-Benzenediol	C6H6O2	110.	1	
1,2,3-Benzenetriol	C6H6O3	126.	1	
Benzoic acid	C7H6U2	122	1	
Benzonitrile	C7H5N	103.	1	
Benzophenone	CIGHIUU	182.	2	-
Selected components for hot sid	Add	<u>R</u> emov	е	
Name	Formula	Mole	ecular Weight	
Water	H20	18.0	1	
Toluene	C7H8	92.1	3	
			ОК С	ancel

设计换热器结构(13)

※点击上图的Add,指定给组分已被添加,如图:

rch Chemical Compone	ents		
I ype a few letters of the wo	rd you're looking for:	Search By	
benzene	🙀 Name	-	
		Databank	
CRaft Street Related Failure and	Alexandrali, Andre	B-JAC and S	tandard 💌
Click items listed below and	then click Add:	· · · · · · · · · · · · · · · · · · ·	
Name	Formula	Molecular Weight	
Barium carbonate	CBA03	197.3	
Benzaldehyde	C7H60	106.1	
Benzene	C6H6	78.1	
1,2-Benzenediol	C6H6O2	110.1	
1,3-Benzenediol	C6H6O2	110.1	
1,2,3-Benzenetriol	C6H6O3	126.1	
Benzoic acid	C7H6O2	122.1	
Benzonitrile	C7H5N	103.1	
Benzophenone	C13H100	182.2	-
	Add	<u>R</u> emove	
elected components for hot	side:		
Name	Formula	Molecular Weight	
Water	H20	18.01	
Toluene	C7H8	92.13	
Benzene	C6H6	78.1	
		ПК	Cancel



※点击上图的OK,出现下图窗口,如图:

File Edit Run Tools Vi	ew Window Help				_
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Hot Stream (1) Composition 💌	💼 🏤 US 💌 👯 🗢 🔿	« » N+			
Shell&Tube	× Composition V Property Methods V	Interaction Param	eters 🛛 🖌 NRTL 🖌 Uni	ac	
M Input	Physical property package	140			
Headings/Remarks	Hot side composition specification	Weight flows	ate or %		
Process Data Property Data	Components	Composition	Component type		
- 📕 Hot Stream (1) Cc	1 Water		Program		
	2 Toluene		Program		
Cold Stream (2) Prop	3 Benzene		Program		
Exchanger Geometry	4	_			
Construction specificatio Program Options	5				
Results	6	_			
	7	_			
	8	_			
	9				
	10				
	Search Databank	Delete Row	Insert Row		
	Component type identifies the component as a r	ion-condensable or	an immiscible in the stream.		

过湿工湿计算机应用基础



※输入热物流各组分的质量浓度,如图:

📩 Untitled - Aspen Exchanger (Design & Rating V7.0 - aspenONE - [Shel	ll&Tube.Input.Property Data.Hot Stream (1) Composition]	_ _ _ ×
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E C Problem Definition	Physical property package B-J	AC V	
Headings/Hemarks	Hot side composition specification	Weight flowrate or %	
Process Data	Components	Composition Component type	
Hot Stream [1] Cc	1 Water	Program	
E Cold Stream (2) Comp	2 Toluene	C Program	
Cold Stream (2) Prop	3 Benzene	C Program	
E-Capatrophics Specification	4		
E Program Options	5		
🗄 🔛 Results	6		
	7		
	8		
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	10		
	Search Databank	Delete Row Insert Row	
	The hot side inlet stream composition.		↓ ok/s ↑ ok/s (6)
For help, press F1.			INS 2013/2/23 17:08



※同理输入冷物流各组分的质量浓度,如图:

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i or nop, provi i i		

过湿工湿计算机应用基础



※点击图中按钮,运行模拟运算,如图:

Image: Inter Earling Tools, Verw Window Help Image: Im	🚓 Untitled - 🖊 spen Exchanger E	Design & Raing V7.0 - aspenONE - [Shell	l&Tube.Input.Property D	ta.Cold Stream (2) Composition]	l		_ 8 X
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Image: Section Control 	Cold Stream Stop	s • 😫 🗢 → «	>> N+				
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Application Digitation Lod side composition Wadget Blowse or %	Headings/Remarks	Physical property package B-JA	AC	<u> </u>			
Process Data Process Proc	Application Options	Cold side composition specification	Weight flowrate or %	•			
I do Steen (1) Core 1 Water 0 Progen Cold Steen (2) For	Process Data	Components	Composition Compo	ent type			
Image: Horizon Stream 210 Program 2 Takane 0.95 Program Image: Horizon Stream 210 Program 3 Bercare 0.44 Program Image: Horizon Stream 210 Program 4 5 Image: Horizon Stream 210 Program 5 - Image: Horizon Stream 210 Program - - Image: Horizon Stream 210 Program	Hot Stream (1) Comp	1 Water	0 Program				
Bencene 0.44 Program 4	Hot Stream (1) Prope	2 Toluene	0.56 Program				
Exchange Genery 4	Cold Stream (2) Prop	3 Benzene	0.44 Program				
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过程工程计算机应用基础



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※ 点击Shell&Tube/Results/Result Summary/TEMA Sheet, 查看所得换热器的设计说明书,如图:

es Unitiled - Aspen Exchanger Design & Rating V7.0 - aspenONE - [Shell&Tube.Results.Result Summary.TEMA Sheet]	
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Process Data 2	
Poperty Data	
Hot Stream (1) Comp	
B Hot Stream (1) Prope S France R- 240 in Tune PEM Hor Connected in 1 parallel 2 content	
Cold Stream (2) Com 7 State or 240 mm 1966 5 Life Contraction 1 provide 1 participation 2 solitors 2 solitors 2 State (1) 2 St	
Cold Stream (2) Prop	
Exchange (seconetry 9 Fluid allocation Shell Side Tube Side	
Consider Specification 10 Fluid name hot water bentolu	
in Gran Cogan Cogan Contraction 11 Fluid quantity, Total Ib/h 676 4409	
H Inout Summary 12 Vapor (In/Dut) Ib/h 676 0 0 2879	
B C Result Summary 13 Liquid B/h 0 6/6 4409 1530	
Warnings & Message 14 Noncondensable 10/11 U U U U U	
Optimization Path 10 Temperature (In/Tur) 212 121 22 77 201 66	
Recap of Designs 10 Feedbalance (10 00) 21126 21102 11 2000	
TEMA Sheet 18 Density Vapor/Lipuid 16/(12) .036 / / 61.851 / 54.258 .162 / 49.95	
Declar Summaly (Under Sum 2) 13 Viscosity cp 0.123 / / .5545 / .5848 0.09 / .2763	
Professional Strongent 20 Molecular wt, Vap 18.01 84.3	
Constraint of the second se	
22 Specific heat BTU/(b F) .4953 / / .9998 / .4183 .3237 / .4603	
23 Themal conductivity BT0/(th F) .014 / / .365 / .081 .01 / .069	
24 Latert reat 61 0/10 356.5 164.9 164.9	
25 1 165306 0 16 00 10 10 16 00 10 16 00 10 16 00 10 16 00 10 10 10 10 10 10 10 10 10 10 10 10	
27 Pressure drop, allow /calc. psi 1.595 .444 3 .866	
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which sources	INS 2013/2/23 17:12



※ 点击Shell&Tube/Results/Mechanical Summary/Sheeting Plan&Tubesheet Layout, 查看所得换热器的平面布置图,如图:





※ 点击Tubesheet Layout 标签下可以查看所得换热器 的管子排列图,如图:





下节内容: Aspen中的物质分离模型

过湿工湿计算机应用基础