

Chapter 1. Blending Crude & Petroleum Fractions

Step 1. “Petroleum with English Units” template & “Assay Data Analysis” run type

Step 2. Assay Data for OIL-1

TBP Analysis		Light Ends Analysis		Properties		
Vol%	°F		Vol Fraction	Mid Vol%	Gravity	wt% Sulfur
6.8	130	Methane	0.001	2		0.00
10	180	Ethane	0.0015	5	90	0.01
30	418	Propane	0.009	10	68	0.013
50	650	i-Butane	0.004	15	59.7	
62	800	n-Butane	0.016	20	52	0.05
70	903	i-Pentane	0.012	30	42	1.15
76	1000	n-Pentane	0.017	40	35	1.62
90	1255	Total	0.0605	45	32	1.90
				50	28.5	2.15
				60	23	2.54
				70	18	3.00
				80	13.5	3.70
				Bulk	31.4	2.30

Step 3. Assay Data for OIL-2

TBP Analysis		Light Ends Analysis		Properties		
Vol%	°F		Vol Fraction	Mid Vol%	Gravity	wt% Sulfur
6.5	120	Water	0.001	2	150	0.00
10	200	Methane	0.002	5	95	0.01
20	300	Ethane	0.005	10	65	0.015
30	400	Propane	0.005	20	45	0.056
40	470	i-Butane	0.01	30	40	1.30
50	550	n-Butane	0.01	40	38	1.70
60	650	i-Pentane	0.005	45		2.00
70	750	n-Pentane	0.0025	50	33	2.30
80	850	Total	0.0405	60	30	2.70
90	1100			70	25	3.20
95	1300			80	20	3.80
98	1475			90	15	
100	1670			95	10	
				98	5	
				Bulk	34.8	2.5

Step 4. MIXOIL — 20 vol% OIL-1 & 80 vol% OIL-2

Step 5. Use default options to generate pseudo components

Chapter 2. Adding a Preflash Tower

Step 1. Start with 1st simulation & change to “Flowsheet” run type

Step 2. “BK10” properties

Step 3. PetroFrac PREFL1F Unit PREFLASH Set Up

Stream ID	Stream Port	Stream Info
MIXCRUDE	Main Column Feed	100,000 sbpd MIXOIL @ 200°F & 60 psi
PF-STEAM	Main Column Feed	5,000 lb/hr steam @ 400°F & 60 psi
LIGHTS	Vapor Distillate from Main Column	
PF-WATER	Condensed Water Decant for Main Column	
NAPHTHA	Liquid Distillate from Main Column	
CDU-FEED	Bottoms Product from Main Column	

Step 4. PetroFrac PREFL1F Unit PREFLASH Operating Parameters

Type Operating Parameter	Operating Parameter
Total Theoretical Stages	10
Condenser Type	Partial with water draw @ 170°F
Reboiler Type	No reboiler, oil & steam feed to bottom stage
Distillate Rate	15,000 sbdp (est) (NAPHTHA)
Pressures	39.7 psi Top Stage 41.7 psi Second Stage 44.7 psi Bottom Stage
Feed Stages	MIXCRUDE to Stage 10 (Furnace) PF-STEAM to Stage 10 (On Stage)
Feed Preheater	Feed Furnace, 450°F & 50 psi outlet
Design Specs	NAPHTHA 375°F 95% D86 (dry, vol% basis) — Distillate Flow Rate

Step 5. Modify Psuedo Component Boiling Ranges

Lower temperature	Upper temperature	Increment
100	800	25
	1200	50
	1400	100
	1640	120

Step 6. Run simulation

Chapter 3. Adding an Atmospheric Column

Step 1. Start with 2nd simulation.

Step 2. PetroFrac CDU10F Unit CRUDE Set Up

Stream ID	Port Name	Stream Info
CDU-FEED	Main Column Feed	
CU-STEAM	Main Column Feed	12,000 lb/hr steam @ 400°F & 60 psi
CU-STM1	Kerosene Stripper Steam Feeds	3,300 lb/hr steam @ 400°F & 60 psi
CU-STM2	Diesel Stripper Steam Feeds	1,000 lb/hr steam @ 400°F & 60 psi
CU-STM3	AGO Stripper Steam Feeds	800 lb/hr steam @ 400°F & 60 psi
CU-WATER	Condenser Water Decant for Main Column	
HNAPHTHA	Liquid Distillate from Main Column	
KEROSENE	Bottoms Product from Kerosene Stripper	
DIESEL	Bottoms Product from Diesel Stripper	
AGO	Bottoms Product from AGO Stripper	
RED-CRD	Bottoms Product from Main Column	

Step 3. PetroFrac CDU10F Unit CRUDE Operating Parameters

Type Operating Parameter	Operating Parameter
Total Theoretical Stages	25
Condenser Type	Total with water draw
Reboiler Type	No reboiler, steam feed to bottom stage
Distillate Rate	13,000 sbdp (est) (HNAPHTHA)
Pressures	15.7 psi Top Stage 20.7 psi Second Stage 24.7 psi Bottom Stage
Feed Stages	CDU-FEED to Stage 22 (Furnace) CU-STEAM to Stage 25 (On Stage)
Feed Preheater	Feed Furnace, 0.03 Fractional Overflash & 24.18 psi outlet
Side Strippers	S-1 side stripper, 4 stages, KEROSENE product Stage 6 Liquid Draw & Stage 5 Vapor Return CU-STM1 stripping steam 11,700 sbpd bottom product rate
	S-2 side stripper, 3 stages, DIESEL product Stage 13 Liquid Draw & Stage 12 Vapor Return CU-STM2 stripping steam 16,500 sbpd (est) bottom product rate

	S-3 side stripper, 2 stages, AGO product Stage 18 Liquid Draw & Stage 17 Vapor Return CU-STM3 stripping steam 8,500 sbpd bottom product rate
Pumparounds	P-1, Stage 8 Partial Draw, Return to Stage 6 49,000 sbpd 40.0 MMBtu/hr cooling (input as negative number)
	P-2, Stage 14 Partial Draw, Return to Stage 13 11,000 sbpd 15.0 MMBtu/hr cooling (input as negative number)
Design Specs	HNAPHTHA 375°F 95% D86 (dry, vol% basis) — Distillate Flow Rate
	DIESEL 640°F 95% D86 (dry, vol% basis) — S-2 Bottoms Flow Rate

Step 4. Run simulation

Chapter 4. Adding a Vacuum Column

Step 1. Start with 3rd simulation

Step 2. PetroFrac VACUUM1F Unit VACUUM Set Up

Stream ID	Stream Port	Stream Info
RED-CRD	Main Column Feed	
VDU-STM	Main Column Feed	20,000 lb/hr steam @ 400°F & 60 psi
OFF-GAS	Vapor Distillate from Main Column	
LVGO	Side Product from Main Column	
HVGO	Side Product from Main Column	
RESIDUE	Bottoms Product from Main Column	

Step 3. PetroFrac VACUUM1F Unit VACUUM Operating Parameters

Type Operating Parameter	Operating Parameter
Total Theoretical Stages	6
Condenser Type	None-Top pumparound
Reboiler Type	None-Bottom feed
Pressures	60 mmHg Top Stage 70 mmHg Bottom Stage
Feed Stages	RED-CRUDE to Stage 6 (Furnace) VDU-STM to Stage 6 (On Stage)
Feed Preheater	Feed Furnace, 0.006 Fractional Overflash & 2.03 psi outlet
Liquid Draws	LVGO from Stage 2; Total Liquid Draw, 8,000 sbpd (est.) HVGO from Stage 4; 17,000 sbpd
Pumparounds	P-1, Stage 2 Partial Draw, Return to Stage 1 20,000 sbpd 28.0 MMBtu/hr cooling (est.) (input as negative number)
	P-2, Stage 4 Partial Draw, Return to Stage 3 49,000 sbpd 80.0 MMBtu/hr cooling (input as negative number)
Design Specs	Stage 1 Temperature @ 150°F — P-1 Duty
Condenser Type	None

Step 4. Run simulation

Chapter 5. Petroleum Properties

Step 1. Start with 4th simulation

Step 2. Add sulfur properties to OIL-1 & OIL-2 via “Data”, “Components”, “Assay/Blend”, & “Petro Characterization” folders

Step 3. Run simulation