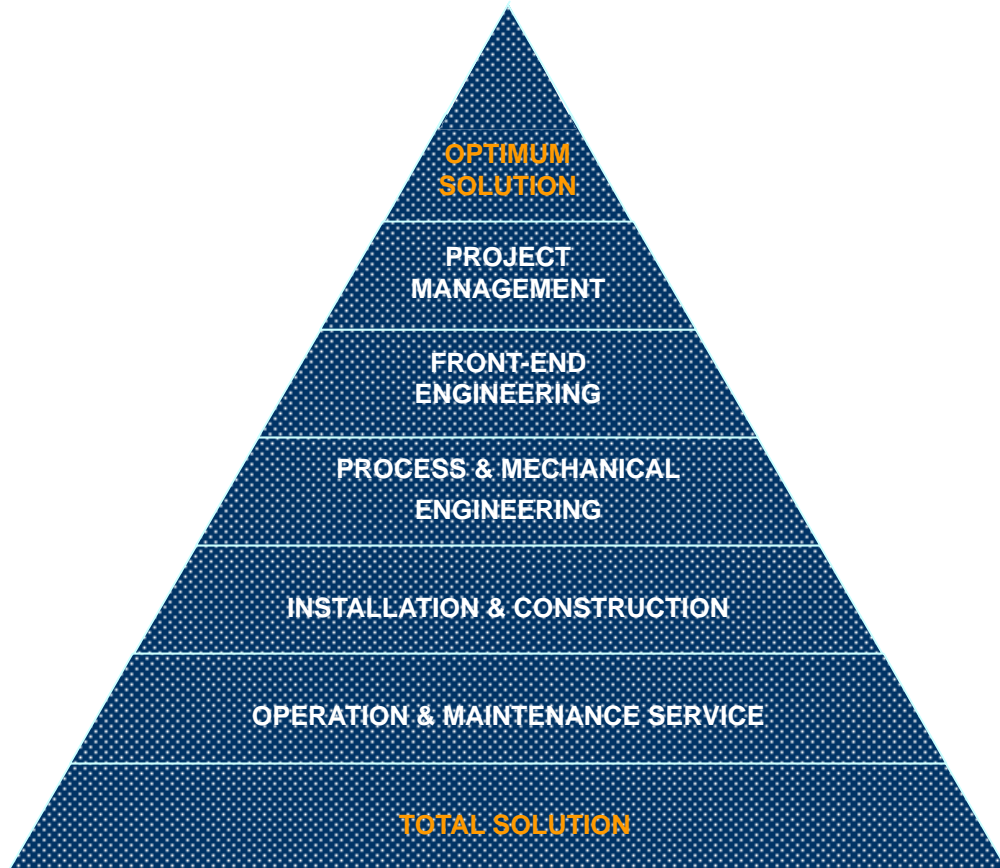


PETROLEUM SOLVENT PLANT



 **Q_iso Technology Co., Ltd.**
Seoul, Korea

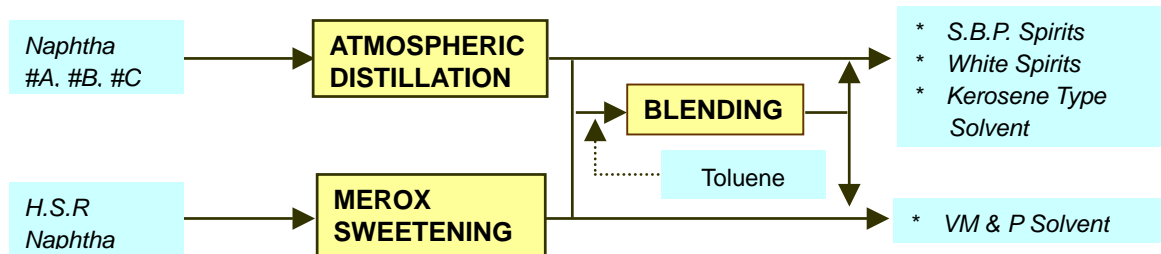
Q_iso's Activities



Since 2000, Q_iso Technology Co., Ltd. (Q_iso) has primarily involved in front-end engineering, process and mechanical design in the field of oil & gas, petrochemical and power industry.

Based on these kinds of diversified experiences, Q_iso, as an Engineering, Procurement & Construction contractor, offers down-stream plant of various scales for solvent, wax and asphalt through a close alliance with Dong Nam Petrochemical Co., Ltd. (Ulsan, Korea) having with accumulated operation know-how for more than 30 years.

PETROLEUM SOLVENT PLANT



Legend:

H.S.R Naphtha : Heavy Straight Run Naphtha
VM & P : Vanish Manufacturer & Paint

PETROLEUM SOLVENT PLANT

Petroleum Solvents are volatile fractions derived from petroleum and are composed mainly of paraffinic, naphthenic and aromatic hydrocarbons in varying proportions.

Petroleum Solvents are usually clear and water-white, apart from a few exceptions which are yellowish to brown in color, which are generally classified by the temperatures at which they start and finish boiling i.e. by their boiling ranges, and can be divided into three main categories;

■ SPECIAL BOILING POINT SPIRITS (S.B.P.s)

S.B.P.s may be narrow or wide boiling fractions, generally within the range 35°C and 160°C. They are fractionally distilled to specially selected distillation ranges and subsequently refined to enable a suitable grade to be chosen for any particular industrial purpose.

■ WHITE SPIRITS

They are fractions intermediate between motor spirit and kerosene, and boil within the range 140°C ~ 225°C. They are also known as Mineral Spirits, Petroleum Spirits, etc.

■ KEROSENE TYPE SOLVENTS

They have boiling range between 160°C to 300°C and have final boiling points above 220°C.

■ PURE AROMATICS

They are pure hydrocarbon compound and boil off at one temperature. Products like benzene, toluene and xylene fall under the above category.



PROCESS FLOW DESCRIPTION

To produce various solvent products in the variance with feedstock, two kinds of processes are involved.

One is distillation process for naphtha A, B, C, with each different boiling points, while the other MEROX sweetening process for HSR (Heavy Straight Run) naphtha.

● ATMOSPHERIC DISTILLATION PROCESS

The feedstock is processed in two distillation units, where naphtha A is distilled in the one unit at the temperature ranging from 170°C to 180°C, while naphtha B, C heavier than naphtha A at around 350°C max. The simplified process flow diagram for the distillation of naphtha #A is shown in Figure 1.

The distillation process separates the major constituents of the naphtha into overhead, light and heavy and bottom product. Each column contains approx. 30 ~ 35 fractionation bubble cap trays, which is equipped with an overhead reflux system and three side heat exchangers/coolers for each cut stream.

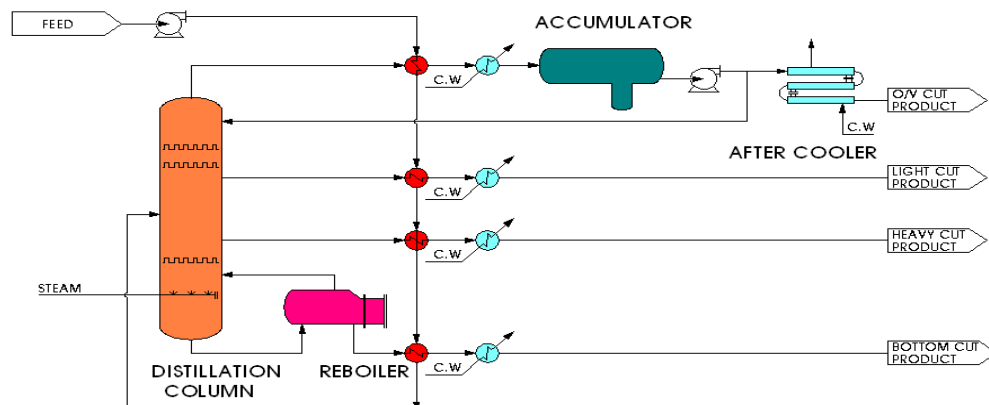
The feed naphtha A is gradually preheated through heat exchangers in each cut stream prior to entering the distillation column. In the mean time, the bottom fraction is further heated in the reboiler, where its temperature is raised to the optimum temperature of the feed tray. The partially vaporized light fraction returns the column, while the heavy fraction flows into the bottom-cut storage tank through heat exchanger and cooler or the other distillation column as feedstock for re-distillation.

At each tray, vapors from below enter perforations under the bubble caps. The latter permit the vapors to bubble through the liquid on the tray, causing some condensation at the temperature of that tray. An over-flow pipe drains the condensed liquid from each tray back to the tray below, where the higher temperature causes re-evaporation. The evaporation and condensation is repeated until the desired degree of product purity is reached. Then side-cut streams from the certain trays are taken off to obtain desired fractions.

The light vapor from the overhead is condensed in an overhead condenser and enters an accumulator where the liquid is accumulated. Reflux pump draws liquid from the bottom of the accumulator and pumps part of the liquid back as a reflux to the distillation column. The balance of the liquid is sent to product storage tanks through the last after-cooler.

As side streams, the light-cut fraction and heavy-cut fraction are drawn from the tray at each part of the column and then flow to product storage tank through heat exchangers and coolers.

Figure 1. Process Flow Diagram (Solvent-Distillation Process)



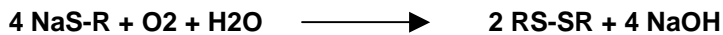
● MEROX SWEETENING PROCESS

Since low molecular weight mercaptans are soluble in caustic soda (NaOH), when treating feedstock such as naphtha, it is feasible to remove these mercaptans by NaOH extraction.

The extraction reaction is shown by the following equation:



Extraction equilibrium is favored by lower molecular weight mercaptans and lower temperatures. The rich caustic containing the extracted mercaptans in the form of mercaptides, is regenerated as shown in the equation given below:



MEROX sweetening involves the catalytic oxidation of mercaptans to disulfides in the presence of oxygen and alkalinity. Air provides the oxygen, and caustic provides the alkalinity.

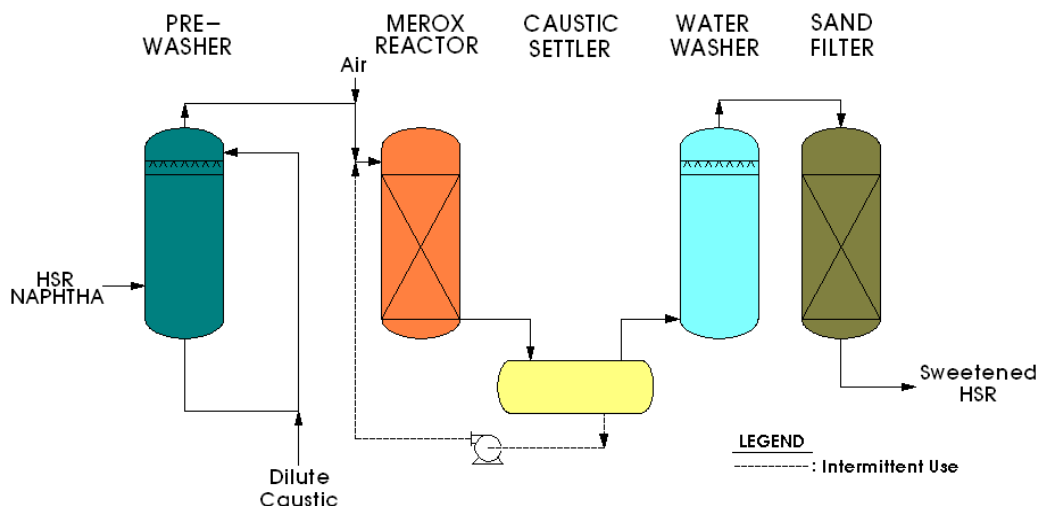
Prior to flowing to the reactor, the feedstock is passed through a caustic pre-wash in order to reduce the naphthenic acid present in the HSR (Heavy Straight Run) naphtha. The Merox unit consists of a fixed-bed reactor followed by a caustic settler. Air, the source of oxygen, is injected into the feedstock upstream of the reactor. The mixture enters the top of the reactor and percolates downward through the catalyst bed.

The operating pressure is chosen to assure that the air required for sweetening is completely dissolved at the operating temperature. The sweetened H.S.R exits the reactor and flows to the reactor caustic settler.

The caustic settler contains a reservoir of caustic for use in keeping Merox catalyst alkaline. The caustic is periodically circulated over the reactor bed, while maintaining operations.

The H.S.R leaving the caustic settler passes through a water wash which removes traces of caustic as well as water soluble surfactants. Solvent product leaving the water wash flows to a sand filter containing a simple bed of coarse sand that is used to remove free water and a portion of the dissolved water from the product.

Figure 2. Process Flow Diagram (Solvent-Merox Process)



FEEDSTOCK PROPERTIES

Naphtha # A: Light naphtha hydrotreated
 Naphtha # B: Heavy naphtha hydrotreated
 Naphtha # C: Hydrotreated kerosene

 H. S. R: Heavy straight run naphtha
 Toluene: Aromatic hydrocarbon

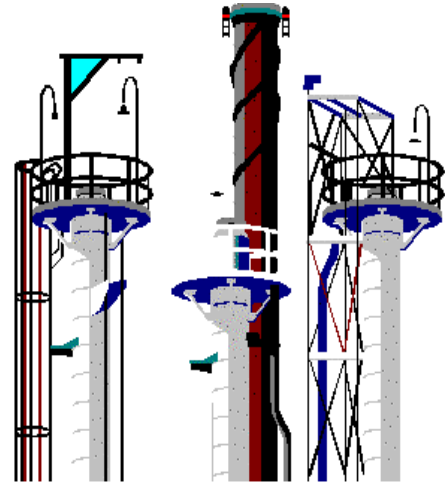


Table 1. - Feedstock Specification

TEST ITEMS	TEST METHOD	FEEDSTOCK				
		Naphtha-A	Naphtha-B	Naphtha-C	H.S.R	Toluene
Specific Gravity, 15°C/4°C	ASTM D 1298	0.692	0.783	0.795	1.76	0.872
Color, Saybolt	ASTM D 156	30	30	30	30	30
Aniline Point, °C	ASTM D 611	58	47	59.5	51	Max. 10
Refractive Index, nD20		1.39	1.43	1.44	1.42	1.485
Flash Point, TCC, °C	ASTM D 56	(-)20	18	45	15	4.4
Distillation, °C	I.B.P	50	105	155	110	107
	50%	80	140	190	130	108
	E.P	140	190	250	170	120

Note: The above is a typical specification of the feedstock, which has been used as main raw materials.



Picture 1.
View of Distillation Unit



Picture 2.
View of MEROX Sweetening Unit

END PRODUCTS

Table 2. - Products Specification

TEST ITEMS		TEST METHOD	Extraction Solvent	Adhesive Solvent	Rubber Solvent	Cleaning	Paint	Rust Prevent Oil
		ASTM						
Specific Gravity, 15°C/4°C		D 1298	064~0.66	067~0.70	070~0.72	073~0.77	077~0.81	0.80~0.83
Doctor Test		D 235	Negative	Negative	Negative	Negative	Negative	Negative
Reactive Test		D 1093	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Copper Strip Corrosion 50°C, 3Hr		D 130	<1	<1	<1	<1	<1	<1
Color, Saybolt		D 156	30<	30<	30<	30<	27<	(+)0<
Aniline Point, °C		D 611	58<	58<	44~55	43~53	47~55	65<
Flash Point, TCC, °C			Report	Report	Report	Report	Report	90<
Distillation, °C	I.B.P	D 86	30<	40<	40<	80<	150<	220<
	50%		<60	<80	<100	<120	<180	<245
	E.P.		<90	<130	<150	<160	<210	<275

DN-200	DN-300	DN-400	DN-500	DN-600	DN-700
--------	--------	--------	--------	--------	--------

Note: The equivalent products are available in the products range of Dong Nam Petrochemical Co., Korea. Other specialty products are also available on customer's request.

APPLICATIONS

EXTRACTION SOLVENT	ADHESIVE SOLVENT	RUBBER SOLVENT	CLEANING SOLVENT	PAINT & THINNER	PAINT SOLVENT
Aromatic & Oil Extraction	Rubber Glue	Tire Industry	Textile Industry	Special Ink Solvent	Paint Solvent/ Diluent
Fatty Acid Extraction	Neoprene Rubber	M/C Cleaning	Dry Cleaning	Aluminium Rolling Oil	Ink Solvent/ Diluent
Dry Cleaning	Dilution Agent	Oil Diluent	Cold Cream	M/C & Metal Cleaning	Phenol Resin Solvent/Diluent
Precision M/C Cleaning	Precision M/C Cleaning		Dye Diluent	Cutting Oil Base Material	Dry Cleaning Solvent
	Hi-Speed Drying Paint Diluent		Paint Thinner	Asphalt Solvent	Insecticide Base Diluent
			Precision M/C Cleaning		M/C & Metal Cleaning
					Oil & Mineral Oil Remover

FURTHER INFORMATION

Phone: + 82 2 2025 7826, Fax: + 82 2 2025 7828
e-mail: qiso00 @ qiso.co.kr

Q_iso Technology Co., Ltd.
No. 806, Ace Techno Tower VIII,
Guro3-Dong, Guro-Gu, Seoul, Korea 152-780
URL: www.qiso.co.kr

