

**KUMAR  
METAL  
INDUSTRIES**



**OILS & FATS  
PROCESSING**





Our technical collaboration with industry leaders, Crown Iron Works–USA and Europa Crown–UK, since 2003, has enabled us to incorporate advanced Crown technology in the design, manufacture and supply of solvent extraction and oil refining plants in a wide range of capacities.



Under our manufacturing license from Anderson International Corp, USA, pioneers of Expeller® press technology we manufacture and sell Anderson Dox Extruders and Solvex Expanders in the Indian market. Each offering is tailored to the unique needs of the customer and is manufactured to the high standards and specifications laid down in Anderson International's design and quality policy.





# WE ARE KUMAR

**K**umar Metal Industries is an EPC company manufacturing advanced oil mills, edible oil refineries, oils and fats processing plants, oleo-chemical plants and feed mills for companies all over the world. We are an ISO 9001-2015 company certified by TUV. We deliver custom, value-driven solutions, technically sound equipment with superior engineering. Through our hard work, integrity and emphasis on responsive service, we've gained the trust of more than 500 customers spread over 65 countries worldwide.

What started as a small fabrication unit in 1939 has grown into an industry favourite. Our manufacturing and fabrication units span over 23,000 sq m and house over 400 skilled technicians, quality control personnel, trained workers and the latest in precision European machinery.

Our fabrication facilities are equipped to manufacture high-pressure vessels and worked on by certified x-ray qualified welders. For hard facing and critical wear and tear parts, our highly trained TIG/MIG welders take over.



23,000 sq m manufacturing  
infrastructure



400+  
staff



570+  
projects



500+  
customers

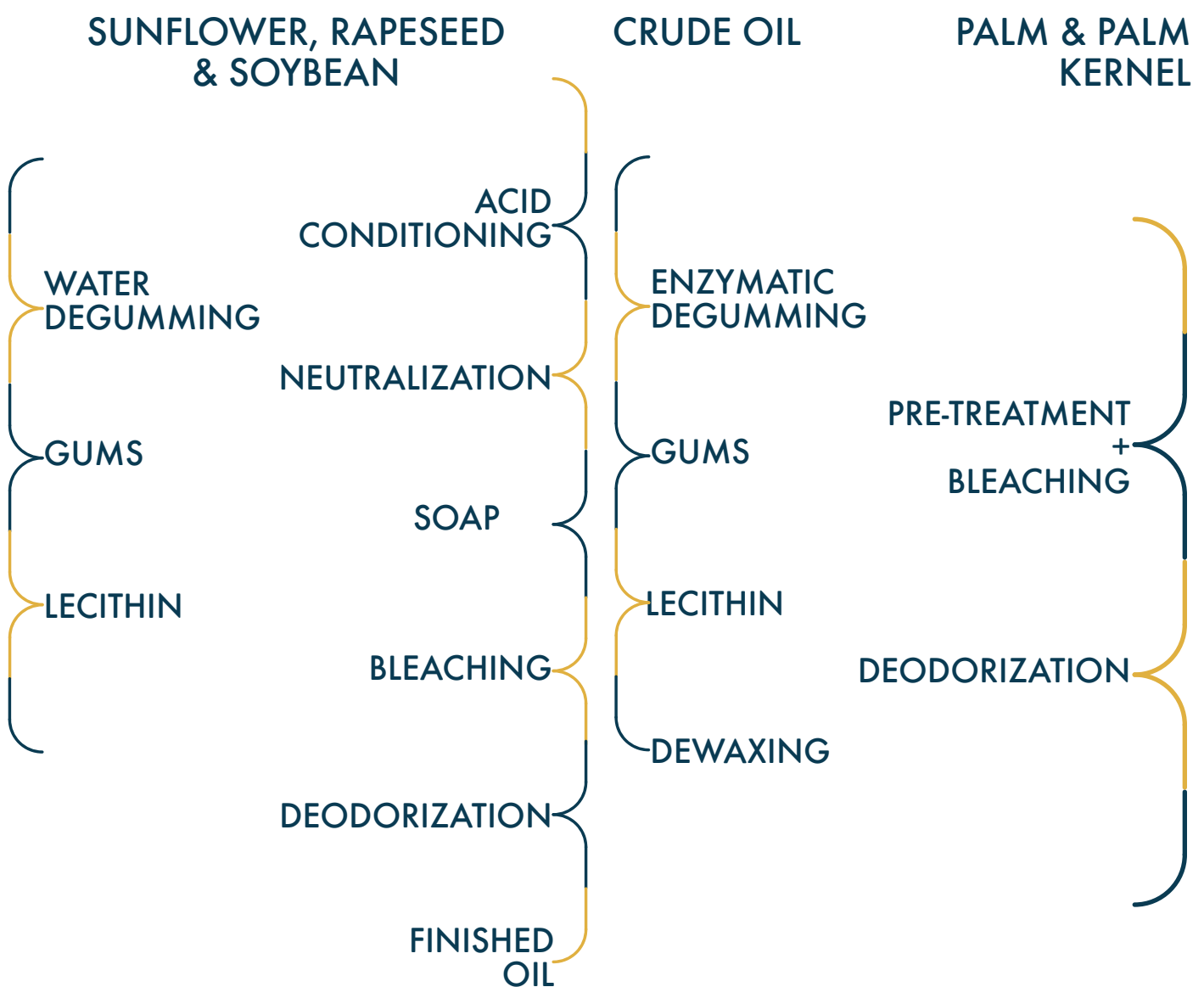


65+  
countries

## WHY REFINING?

**V**egetable oils are refined using two distinct methods - Physical and Chemical Refining, differentiated on the principle of Free Fatty Acid (FFA) separation. In Chemical refining, FFAs are neutralized by caustic soda, whereas FFAs are removed through distillation or acid conditioning in Physical Refining.

Oils extracted from solvent extraction plants or screw presses contain a variety of impurities and unwanted products including phosphatides, colour pigments, odoriferous compounds and FFAs. Separation processes that eliminate these impurities are called refining.





## DEGUMMING

**D**egumming removes phosphatides, commonly known as gums. Gums are either hydratable and non-hydratable phosphatides. Hydratable phosphatides are separated in the water degumming stage while non-hydratable phosphatides are removed by gum conditioning and alkali refining or enzymatic degumming.

**APPLICATION:** Degumming is used for vegetable oils with inherent phosphorous compounds like soybean, rapeseed, mustard and sunflower.

### WATER DEGUMMING

Commonly used to separate phospholipids from vegetable oils. Warm water is added to crude vegetable oil, and the mixture is agitated slowly for a predetermined time in a process referred to as hydration. Hydrated oil is sent to a centrifugal separator for separation where oil and gums are separated due to centrifugal forces.

**APPLICATION:** To separate phospholipids from crude vegetable oils like soybean, sunflower, groundnut and canola.

### ENZYMATIC DEGUMMING

Processing oils at low temperatures while retaining sufficient output quality has been a long-time challenge for the oil and fats industry.

Enzymes are quite specific in their target selection and react only with phospholipids, reducing emulsification properties of phospholipids while creating easily separable fractions. Enzymatic degumming is similar to water degumming - oil is hydrated and treated with enzymes, which react with phospholipids and separate the phosphorous group from the lipid group forming distinct oil and water-soluble compounds. Oil and water are then separated in a centrifugal separator.

Enzymatic degumming is preferred over traditional water degumming as they eliminate the emulsifying properties of phospholipids, resulting in a reduction of oil carry-over and resulting pollution free atmosphere.

**APPLICATION:** Preferred for adherence to low pollution norms.

### ACID DEGUMMING

Removes hydratable and non-hydratable gums. Crude oil is treated and mixed with a strong acid like phosphoric acid or citric acid. Hot water is mixed, which forms a complex with phospholipids and results in the precipitation of phosphatides. The gums are then separated by a centrifugal separator, followed by alkali refining.

**APPLICATION:** In conjunction with chemical refining preferably for non-hydratable and high fibrous matter.

### THE KUMAR ADVANTAGE

- Hydration time with 20 - 25 minute retention provides ample time to condition hydratable gums.
- The reaction vessel features an efficient dish and doughnut design with mechanical agitation, which saves energy and minimizes wear and tear.
- A high shear mixer to mix the acid solution and oil effectively.
- Increased oil yield with efficient gums separation and low oil carry-over.
- Valuable feed ingredient in gums.
- Reduced environmental impact from lower water consumption in the ETP, reduced energy and chemicals.
- Increased profits with easier processing of feed oils and by-products.



## ALKALI REFINING

**T**he process of neutralizing the free fatty acids in oils by a strong base (alkali) is known as alkali refining. The steps in alkali refining include gum conditioning, alkali neutralizing and washing.

**APPLICATION:** Alkali refining is used for sunflower, rapeseed and soybean oils.

### ALKALI NEUTRALIZING

For low-quality oils or oils with FFA of more than 0.1%, full neutralization is carried out after gum conditioning to maintain oil output quality. Gum conditioned oils are treated with caustic soda in a conditioning reactor for a short time where FFAs are converted to non-hydratable phosphatides and soap-stock which form a heavy phase, and separated in a centrifugal separator.

### SHORT MIX

Degummed oil is heated and conditioned with phosphoric acid or citric acid, and caustic lye is added. This causes free fatty acids to react with the sodium hydroxide (caustic lye) forming soap stock, which is then removed by centrifugation. Neutralized oil still contains traces of soap and water washing is carried to remove these traces of soap.

### EXTENDED MIX

Oils with high non-hydratable phosphatides require longer residence time for reaction, especially soybean and rapeseed as well as oils with higher free fatty acids. The extended mix process is specially designed to address this problem. High FFAs require more substantial concentrations of caustic soda and longer residence time to complete the reaction. Neutralization is effectively carried out by caustic. The soap formed also carries away other impurities including colour pigments and trace metals during centrifugation.

### WATER WASHING

Neutral oil from centrifuge is mixed with hot water to remove the remaining soap from the oil.

### GUM CONDITIONING

Water degummed oil is heated and conditioned with phosphoric acid or citric acid to remove non-hydratable phospholipids, using proper retention time and separated with soap stock. This pre-treatment process is also used before bleaching oils like crude palm and palm kernel oils during the physical refining process.

### VACUUM DRYING

Washed oil is sprayed through a specially designed nozzle in a vessel held under a vacuum of 60 torr. The oil is dried continuously in the vacuum drier and sent for further processing.

### THE KUMAR ADVANTAGE

- Atmospheric reactor with variable retention time and agitation to optimize both degumming and neutralizing processes.
- Temperature control at each step of the process.
- Conditioning reactor ensures maximum precipitation of non-hydratable gums.
- Neutralization tank acts as a buffer to dampen flow fluctuation during separator discharge resulting in reduced oil loss.



## CONTROLLED FLOW CAVITATION

**K**umar represents Arisdyn for CFC Systems. The system utilizes the principle of jet compression and decompression to generate cavitation in a controlled environment to separate a heavy phase from a lighter phase. The effect of cavitation is improved dispersion and decreased consumption of phosphoric acid, caustic soda and water in the degumming and neutralization processes. This CFC technology by Arisdyn Systems is a novel yet proven technology with added benefits of increased oil yield in refining systems.

**APPLICATION:** To reduce chemical composition

### THE KUMAR ADVANTAGE

- Efficiently designed systems result in a precise reaction which removes soap stock with minimum oil carryover.
- The precisely designed process reduces the consumption of acid and water.
- Water washing removes residual traces of gums and soaps, which reduces adsorbent consumption in bleaching.

## MISCELLA REFINING

**M**iscella is the mixture of oil and hexane leaving the solvent extraction plant, and the process of separating the two is called miscella refining. It is generally carried out at the oilseed solvent extraction plant for economical single solvent recovery. Miscella from the solvent extraction plant is fed buffer tank to adjust the miscella concentration by mixing it with miscella. Miscella with adjusted concentration is transferred by pump through the filter and heated to conditioning temperature and phosphoric acid will be dosed.

Acid conditioned oil is passed through High Shear Mixer where caustic is added. Caustic treated miscella is transferred to the reaction vessel for uniform mixing and saponification. The mixture is then heated to separation temperature and fed to a centrifugal separator. The treated oil is then sent back to the Solvent extraction plant for distillation. The soap separated is collected in soap stock tank & then transferred to DT or storage by soap stock pump

**APPLICATION:** To reduce chemical composition of high FFA oils like cottonseed and rice bran.

### THE KUMAR ADVANTAGE

- Lower refining loss.
- Lighter coloured refined oil.
- Elimination of water washing.

## PRE-TREATMENT & BLEACHING



**T**he process of removing visible impurities and colour pigments from vegetable oils is known as bleaching. Traces of gums, soaps are removed as an added advantage. This process is typical to both physical and chemical refining - the only difference is that crude oil is pre-treated in physical refining, whereas, in chemical refining, neutralized oil can be directly fed into the bleacher.

**APPLICATION:** Bleaching is used for soybean sunflower, rapeseed, palm and palm kernel oils.

## PRE-TREATMENT

Pre-treatment is used as part of the physical refining process to remove traces of gums and impurities, ideally to the processing of oils like palm, palm kernel and coconut. Incoming oil is heated and mixed with phosphoric or citric acid. The mixture is then transferred to the conditioning reactor, where it is held for a pre-determined period to complete the reaction, where bleaching earth absorbs the phospholipids.

## BLEACHING

Bleaching removes colour pigments and traces of soap by adding bleaching earth under vacuum at prescribed temperature and retention time. Oil is then filtered by separating it from the bleaching earth, followed by the polishing filter. Bleached oil is either stored or sent for further processing. The spent cake is dried with steam blowing to recover more oil.

Kumar's Bleacher is equipped with an efficient mechanical agitator and sparging steam that allows the oil to adsorb the bleaching earth completely. Coils are provided to increase the temperature if additional heating of the oil is called for.

### THE KUMAR ADVANTAGE

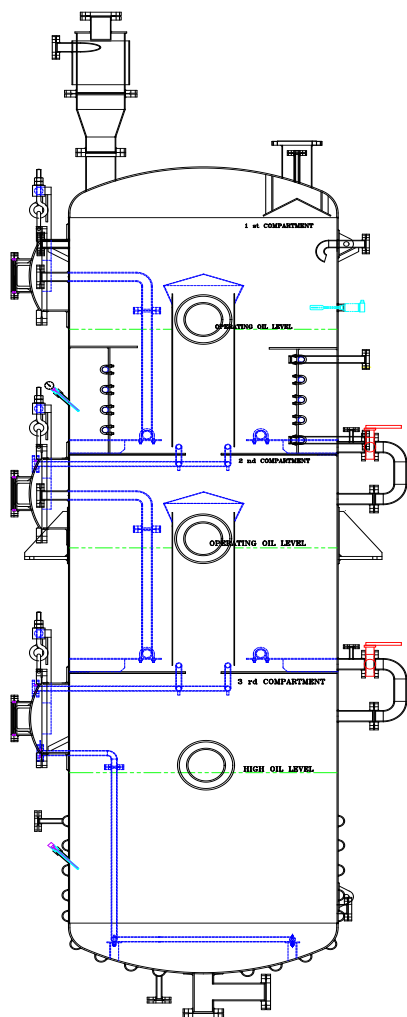
- ⬢ Automated cleaning of filters by steam blowing.
- ⬢ Special vibrator assembly to discharge spent earth from pressure leaf filters.
- ⬢ Highly efficient Dutch weave filter leaves made in SS 316.
- ⬢ Optional pneumatic conveying system for bleaching earth.
- ⬢ Kumar offers several bleaching processes using bleaching clay singly or in combination with silica and activated carbon.
- ⬢ Kumar Bleachers can be used in various bleaching process configurations.

## ECOPURE BLEACHER

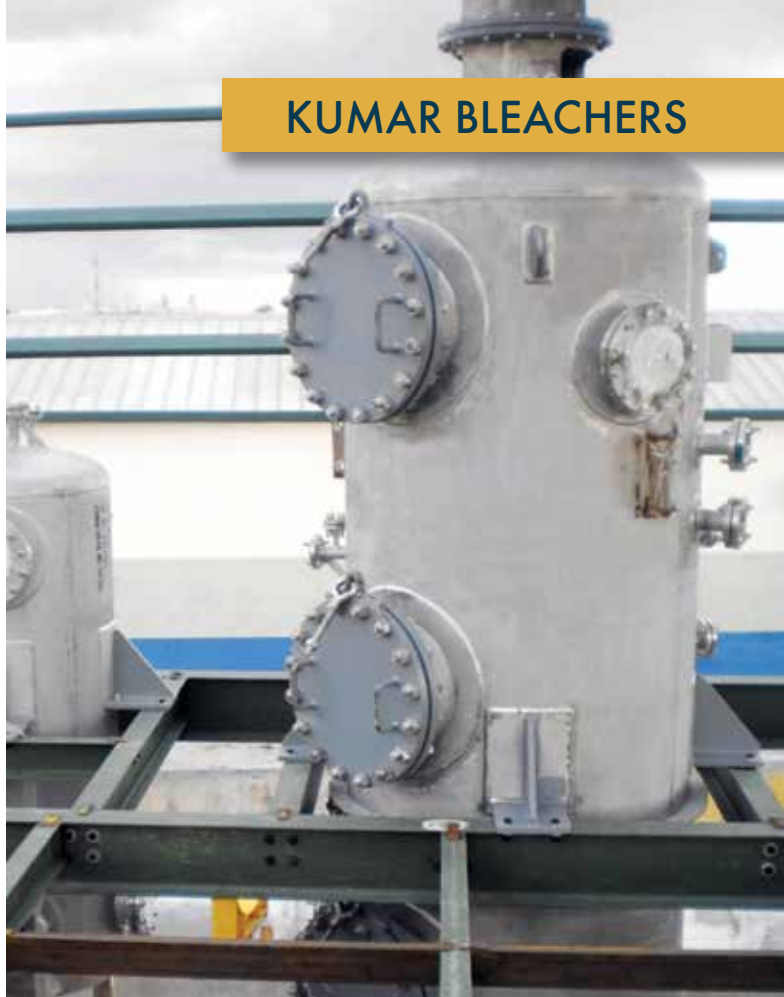
Kumar's EcoPure Bleacher is designed for minimum space requirement with a reduced capital cost. Compact Bleacher consists of slurry mixer and bleacher in the same vessel. The Bleacher is a compact single vessel that houses a slurry mixer and a bleacher to prepare and bleach earth slurry. It is equipped with a sealed agitator to homogenize the mixture and limpet coils to externally heat oil and ensure the uniform quality of the bleached oil. Its efficient design couples mechanical agitation with sparging steam for better contact between the oil and bleaching earth.

### THE KUMAR ADVANTAGE

- Space-saving design that reduces capital cost.
- Low power consumption due to the ultra-efficient agitation system.
- Sight glass to view and monitor product quality.
- The vacuum system maintains product quality suitable for oil deodorization.



## KUMAR BLEACHERS



## STABLE BLEACHER

While bleaching systems have become increasingly reliable over the years, to reduce power consumption and move to greener technologies, Kumar recommends steam-agitated bleachers for zero electricity consumption and reduced maintenance. Here, bleaching earth is mixed in a slurry mixer and then sent to the stable bleacher.

### THE KUMAR ADVANTAGE

- Completely static equipment ensures zero wear parts and reduces maintenance inventory.
- Easy access for routine cleaning and maintenance.
- Uniform product quality and high-quality assurance.
- Absence of gearbox and motor reduces power consumption, lubrication and replacement of bearings which saves labour cost for maintenance.
- Efficient mammoth pumps for intensive agitation.
- Absence of mechanical agitator, Bleacher is free from agitator seal leakage

# DEODORIZATION

The final step in refining is the deodorization process where the oil is stripped off of free fatty acids and odoriferous substances. Additionally, the oils are heat bleached to attain the required product quality.

Physical deodorization using stripping column is carried out for hard oils with high FFA content including palm, shea butter, palm kernel while chemical deodorization is used for soft oils with low FFA content like soybean, sunflower, cottonseed, rapeseed and canola.

Bleached oil is heated and fed to the deaerator, to remove air and moisture. After deaeration, the oil is heated by outgoing deodorized oil in the economizer. This step gives maximum heat recovery. Pre-heated oil is further heated to required deodorization temperature by a high-temperature heater and then sent to the deodorizer for further processing.

Oil is deodorized by stripping off FFA and odoriferous compounds under high vacuum. The vacuum reduces the boiling point of FFAs and odoriferous compounds. This reduces the working temperature of the deodorizer and also minimizes steam consumption. The final oil is then passed through the polished filter and sent to storage.

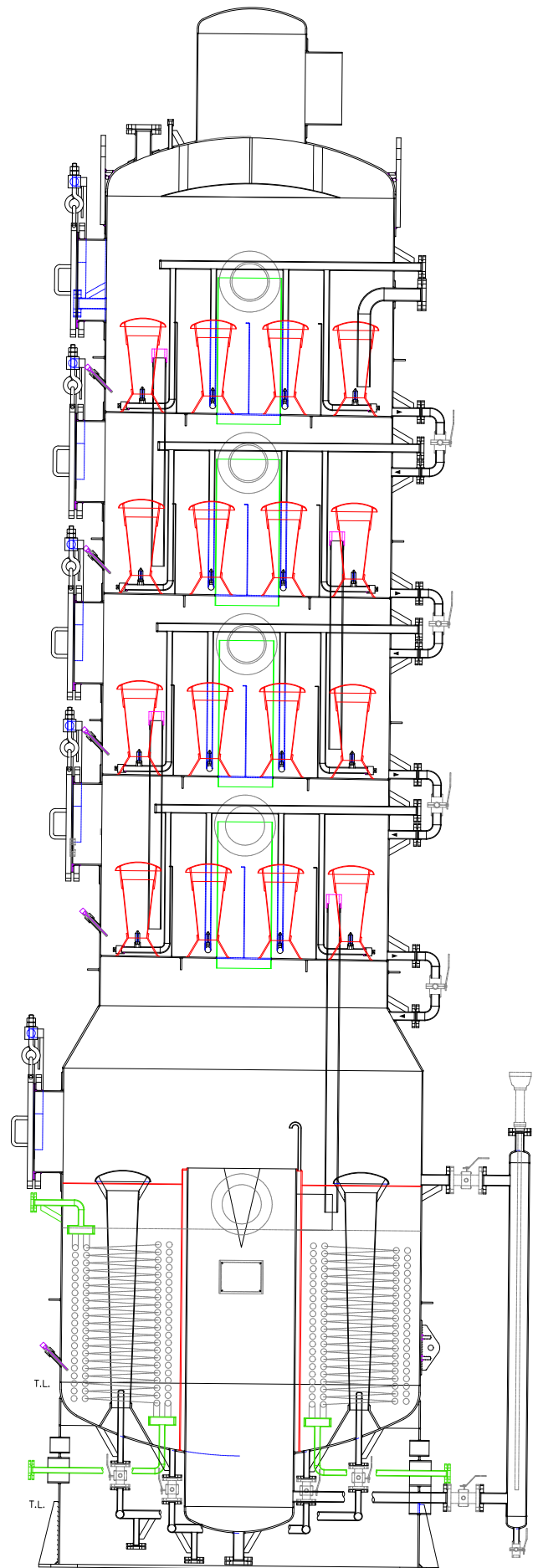
**APPLICATION:** To remove acidic compounds, volatile matter, sterol and carotenes.

## ECOSTEAM DEODORIZER

Specially designed for soft oils, this deodorizer is equipped with a mammoth pump for sparging steam to create dispersion for maximum vapor exposure to vacuum. It has an inbuilt economizer to cool deodorized oil with incoming bleached oil resulting in high heat recovery. Use of thermosyphon diminishes the chemical chances of adulteration.

### THE KUMAR ADVANTAGE

- Uniform sparging steam in each compartment.
- Improved stripping effect at low steam consumption.
- Specially designed to maintain uniform vacuum in each compartment.
- Adequate retention time.
- Improved oil stability.
- Inbuilt vacuum heat recovery heat exchanger.
- Environment friendly chilled water vacuum system.
- Easy access for maintenance.



## ECOPACK DEODORIZER

Kumar's EcoPack Deodorizer is used to physically refine oils (palm, palm kernel, rice bran, etc) with an FFA content above 3%. Oil is fed to a column with specially designed structured packing. The oil flows down in a thin line along the packing while the counter-flowing stripping steam efficiently strips off the FFA. Odoriferous substances are stripped off, and the oil attains a bland taste and low colour. EcoPack Deodorizers are specially designed to reduce generation of trans fats and deliver better performance than guaranteed.

### THE KUMAR ADVANTAGE

- Specially designed stripping column for higher FFA oil with a minimum pressure drop across stripping column.
- Environment friendly chilled water vacuum system and inbuilt vacuum heat recovery heat exchanger.
- Improved sparging steam arrangement, with low steam consumption.
- Improved oil stability.
- Easy access for maintenance.

## CROWN DIFLOW DEODORIZER

The challenge of cross-contamination always accompanies multiple feeds processing. While it is impossible to avoid cross-contamination, it needs to be kept at a minimum. KMI's Crown DiFlow Deodorizers are specially designed for multiple stock changes (up to 8) per day. This is a semi-continuous deodorizer where the oil is deaerated in a batch. The batch is dropped every 15-20 minutes for processing through the deodorizer.

Pre-heating by steam generated from pre-cooling tray by deodorized oil. Oil is then stripped with steam and agitated by steam lift pumps which increases the oil surface area under full vacuum therefore increasing the deodorization efficiency. Each tray acts as a single batch, minimizing cross-contamination. Heating steam is provided by high-pressure steam generated by a thermosyphon heater. FFAs and odoriferous substances are condensed in the scrubber.

### THE KUMAR ADVANTAGE

- Minimum product mixing.
- Minimum steam requirements due to shallow layers and highest heat recovery by double thermosyphon loops.
- Minimum steam consumption.
- Additional heat recovery possible by heating water for boiled feed.
- Plant sizes start from 30 TPD.

## DEODORIZATION



# FAT MODIFICATION

## DRY FRACTIONATION

Dry fractionation is the process of separation oil and fats of high and low melting point triglycerides by crystallization at low temperature and filtration without use of solvent.

**APPLICATION:** To separate light fractions to make it suitable for direct consumption.

## CRYSTALLISATION

The oil is first preheated to 65-deg C to maintain consistency and then fed to the crystallizer where it is cooled in a predetermined manner. Process parameters can be monitored and controlled with the help of PLC controller to form crystals. Once crystals are formed in the Eco Cool crystallizer, the slurry containing crystals are sent to the membrane filter press for separation of phases.

## FILTRATION

Slurry pumped from crystallizer to the Membrane Filter Press, where solid and liquid phases are separated. The solid phase (stearin) is retained in the filter as cake, and the olein passes through olein tube as filtrate. Olein from the cake is recovered by squeezing the stearin cake with the help of liquid.

## HYDROGENATION

Hydrogenation is used to increase the melting point of vegetable oil and its oxidative stability. It adds hydrogen atoms to the oils and turns it into hardened spread/margarine suitable for spreads and confectionery. Hydrogenation increases the melting point of vegetable oils and adds a rich texture to vegetable oils.

Hydrogenation is achieved by partially saturating carbon compounds with hydrogen atoms, increasing its melting point. The heated oil is fed to the autoclave where hydrogen is added at required pressure along with the catalyst. Oil is agitated in the autoclave at a controlled temperature to ensure uniform hydrogenation throughout the entire batch. Reaction time is dependent on the catalyst and oil temperature. Hydrogenated oil is then passed through suitable filters where the oil is separated from the catalyst and sent for storage.

**APPLICATION:** To change the molecular structure for stability of all the oils.



### THE KUMAR ADVANTAGE

- Flexible operations for operator control of various process parameters and complete process automation with programmable logic controller (PLC).
- Specially designed agitator to prevent settling of crystals at the bottom of the dishend.
- Optimum cooling efficiency with specially designed coils and speed controlled agitator to homogenize slurry.
- Suitable to produce olein as well as super-olein from palm oil in the same plant.

### THE KUMAR ADVANTAGE

- Double spiral coil for efficient temperature control and sufficient heat transfer.
- Precise process control with the help of the latest instruments and control systems.
- Agitator for high-pressure autoclaves ensures complete vacuum sealing and low maintenance operations.
- Automatic cleaning of filters which increases plant uptime.

### INTERESTERIFICATION

The process of rearranging fats from one triglyceride molecule to another with the help of a catalyst (usually sodium methoxide) is known as interesterification.

Intesterification is used to alter the melting point of fats or change their texture or make a uniform blend from two completely different oils. Intesterification avoids the formation of trans-fatty acids and results in healthier modified fats with excellent oxidative stability, rich texture and improved taste.

Vegetable oils are treated with a catalyst in a reactor. The oil is circulated through the autoclave in order to complete the reaction. Once the reaction is complete, the interesterified oil is bleached, filtered and then sent for storage.

Kumar's interesterification protocols allow fats producers to create a variety of blends with the same set of utilities. Precise parametric control allows the creation of interesterified fats with least amount of refining.

**APPLICATION:** To rearrange molecular structure of the blended oils for stability.

#### THE KUMAR ADVANTAGE

- Double spiral coil for efficient temperature control and sufficient heat transfer.
- Precise process control with the help of the latest instruments and control systems.
- Agitator for high-pressure autoclaves ensures complete vacuum sealing and low maintenance operations.
- Automatic cleaning of filters which increases plant uptime.

### DEWAXING & WINTERIZATION

Oils of particular seeds like sunflower, corn, rice bran, and cottonseed contain waxes (long-chain high melting compounds) which impart haziness to the oil at low temperature. Oil is cooled to crystallize high melting compounds and followed by filtration to separate waxes from oils. Sunflower, corn, cottonseed are dewaxed while rice bran and hydrogenated soybean are winterized.

Bleached oil is first cooled through a series of heat exchangers and then fed to the crystallizer. Filter aid is added through the valve dosing system, which helps to prevent the choking of horizontal pressure leaf filter. Crystallizers are equipped with double-layered coils circulated with chilled water. Once, crystals form, the oil is filtered through dewaxing filters and sent for further processing.

**APPLICATION:** For stability of oils by removing wax content

#### THE KUMAR ADVANTAGE

- Specially designed VFD driven crystallizers for complete process control.
- Minimum utility consumption.
- Special double-layered coil crystallizers.
- Shell retraction filters for easy cleaning.
- Automatic cleaning filters for ease of operation.
- Multiple options for filters - plate and frame, horizontal pressure leaf, gravity filters.

## 3 MCPDE, GE & CHEMICAL REFINING

Palm oil is one of the most widely used vegetable oils in the world. If global trends are any indication, the demand is only rising, but at the same time, this oil is the subject of debate. Fatty acid esters such as 3 MCPDE (3-monochloropropane-1,2-diol esters) and GE (Glycidyl esters) are present in all kinds of fats and oils. Palm oil, however, exhibits these esters in excessively high quantities, requiring their removal as they are suspected carcinogens.

3 MCPDE formation takes place due to the presence of chlorides, mono and diglycerides as well as process parameters including high temperatures, processing time (harvest to refining) and the acidic value of oils. Glycidyl esters (GE) are formed due to the processing of food items at high temperatures and the processing timeline at high temperatures. GEs form as a result of high-temperature deodorization and the presence of a higher amount of FFAs. One method used to reduce the formation of 3 MCPDE is to reduce contact with chloride ions. GE formation can be mitigated using various solutions for refining applications. However, attaining the lowest possible value of 3 MCPDE and GE requires additional processes to be followed.

Kumar offers solutions for both, oil millers as well as refiners to mitigate the formation of 3 MCPDE and GE in the output oil.

**APPLICATION:** 3 MCPDE & GE refining is used for palm oil.



### THE KUMAR ADVANTAGE

- Simple solution - easy installation and easier operations.
- Phospholipids are removed as an added advantage.
- Low 3 MCPDE allows physical refining of high-quality oils.

## CPO WASHING

Chloride esters are water-soluble and can be separated from crude palm oil by washing the CPO with chlorine-free water. Water is intensively mixed with CPO with chloride ions pass from CPO to oil, after which oil and water are separated by centrifugation. Wastewater carries away chloride ions, significantly reducing the chances of formation of 3 MCPDE. Installation is simple and can fit on to working plants without any significant changes to the oil mill layout.

## CHEMICAL REFINING

Kumar recommends chemical refining for the highest quality of output oil with minimal 3 MCPDE and GE technically possible. Chemical neutralization allows oil deodorization at low temperatures which significantly reduces the GE content in the end product. Sodium hydroxide not only neutralizes the oil but also results in an additional reduction of chloride ions, which in turn reduces the formation of 3 MCPDE in the oil at later stages.

**APPLICATION:** To withstand normal standard edible consumption norms.

## MITIGATION OF 3MPCD

3-MCPD esters form at relatively low temperatures (140°C). It is not possible to control or minimize their formation during deodorization. Bleaching is, therefore, the most critical refining stage for mitigation of 3-MCPD esters, and vital to select the proper grade of bleaching earth (natural or non- HCl activated). Depending on the CPO quality and the efficiency of the washing process, physical refining of freshly washed CPO along with the use of natural bleaching earth can deliver 3-MCPD ester levels between 1-2ppm.

### THE KUMAR ADVANTAGE

- Lowest possible values of 3 MCPDE and GE in refined oil.
- Output oil is of the highest, premium quality.
- Chemical refining allows deodorization of palm oil at low temperatures reducing the heat load of the deodorization process.

### LECITHIN DRYING

Lecithin is a generic term used for yellow-brownish phosphatides components in plants. These are composed of choline, phosphoric acid and esters of glycerol - a mixture of phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol. Lecithin, a mixture of phospholipids is in special demand due to its amphiphilic nature, i.e. dissolves in both polar as well as non-polar compounds.

Lecithin compounds are excellent emulsifiers and have attracted the attention of food processors in various applications. Commercial sources of vegetable lecithin are soy, sunflower and rapeseed. Food grade lecithin can be prepared from vegetable oils.

Wet gums separated during degumming are used for lecithin production. During the drying process wet gums are fed to the lecithin dryer, and the moisture is evaporated from lecithin under carefully controlled conditions. Dried lecithin is then cooled off and sent to storage.

**APPLICATION:** To recover lecithin from wet gums to use in value added products.

### SOAP STOCK ACIDULATION

Soap stock generated from miscella refining has residual hexane. Generally, this soap is added in DT and mixed with meal but this deteriorates the quality of meal as well as increases the load on distillation system.

Kumar's soap stock desolventization plant recovers this hexane and remove the residual hexane from soap stock generated from Miscella Refinery. The recovered hexane is recycled back to Solvent Extraction Plant.

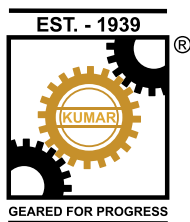
The hexane free soap stock is easy to process safely..

**APPLICATION:** Soap stock acidulation is used for soybean oil

### FATTY ACID DISTILLATION

Acid oil or deodorizer distillates has to be purified for economical utilization. Both are distilled to obtain required fractions which can be easily utilized by various processors and converted into usable products.

**APPLICATION:** For processes such as oleochemicals, surfactants and biofuel.



# KUMAR METAL INDUSTRIES PRIVATE LIMITED

## REGISTERED OFFICE

#101, Kakad Bhavan, 30th Road,  
Opposite Gaiety Galaxy Cinema,  
Bandra W, Mumbai 400 050  
INDIA  
T: +91 22 2644 1667 | 6699 0123

## CORPORATE OFFICE

#7, Mira Co-operative Industrial  
Area, Western Express Highway,  
Mira Road E, Thane 401104  
INDIA  
T: +91 22 2845 8300/9100

[info@kumarmetal.com](mailto:info@kumarmetal.com)  
[kumarmetal.com](http://kumarmetal.com)

