

# WASTE OIL RECYCLING PLANT OF 900 MTPY

MANUFACTURED BY  
GADGIL & CO  
PUNE

- Treatment of waste oil is decided by its content.
- **Tank bottom oil (input oil batch 10%)**
  - Residue oil left in injection molding oil storage tanks ,transformer oil storage tanks etc.
  - Has oil content of 40 to 60 %
  - It is checked for pH content as mostly dilute HCL is used for cleaning tanks at customer end.
  - If water is removed can be re-refined & made in base oil
- **Mixed oil water emulsions (input oil batch 5%)**
  - They are not specifically generated as part of any process ,but have been rendered incapable for its intended use
  - Has oil content of 50 to 60 % & sediment of 5 to 10 %
  - Being mixed stream oil they cannot be easily separated & are more viscous at room temperature .
  - It cannot be re-refined & final product is furnace oil.

- **Waste oil recycling setup**



The input oil received by us in category of waste oil are

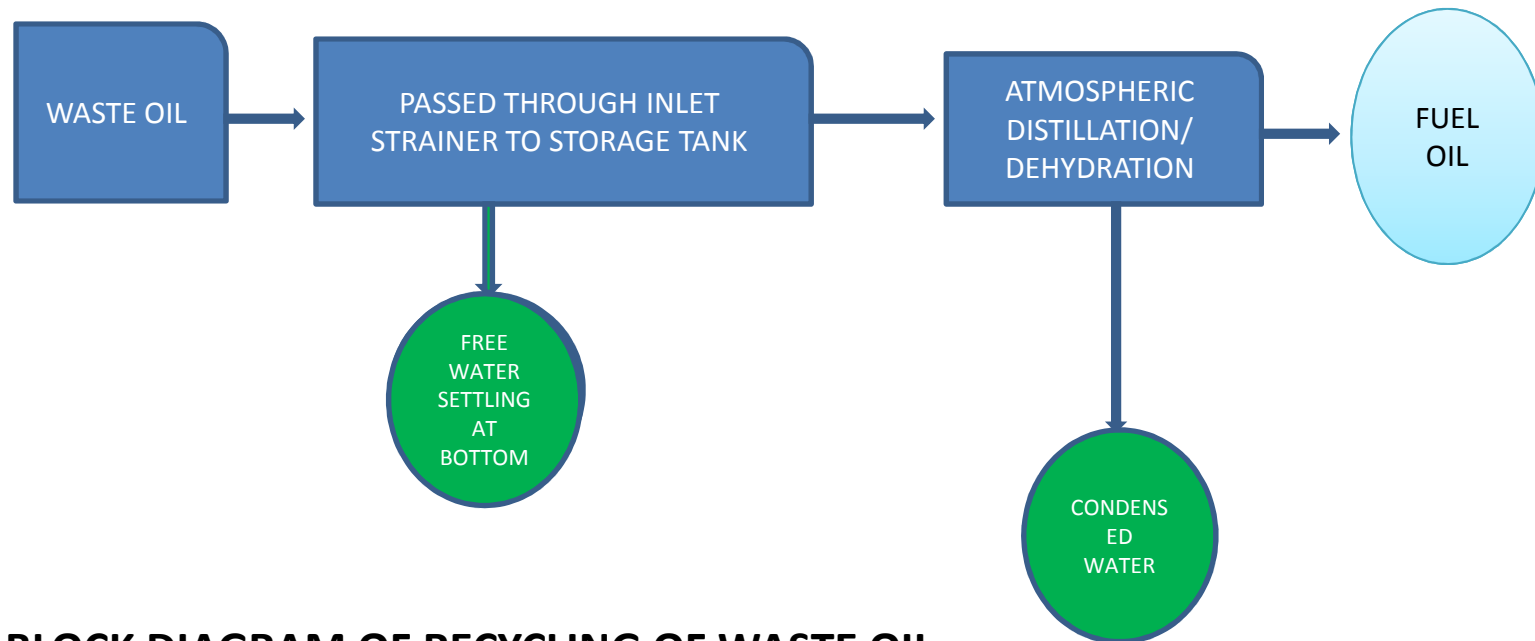
Tank bottoms

Mixed oil water emulsions



- The input oil have different percentage of water content & storage in single container for homogenization is impractical . Hence they are stored in a lot in different drums.
- The waste oil is checked for sediments, flash point, water content(refractometer) and sorted.
- All waste oil is filtered through inlet strainer & kept ready for further processing

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**BLOCK DIAGRAM OF RECYCLING OF WASTE OIL SETUP**

# WASTE OIL RECYCLING PLANT 900 MTPY

THE OIL IS SUCKED UNDER VACUUM THROUGH A INLET STRAINER TO STORAGE TANK. THE TANK IS EQUIPED WITH INTERNAL HEAT EXCHANGER TO RAISE TEMPERATURE OF FILLED WASTE OIL TO 95 °C.

THIS HELPS IN EFFECTIVE DECANTATION OF FREE WATER WITHOUT USE OF ANY ACID FOR BREAKING EMULSION.

THE FREE WATER SETTLES AT BOTTOM WHILE OIL FLOATS ON TOP AS PER ITS SPECIFIC GRAVITY.

THIS FREE WATER IS REMOVED FROM BOTTOM OF TANK & STORED IN DRUMS.

LIME IS ADDED TO THE WATER & COMPRESSED AIR IS USED FOR AGITATION.

THE CLEAN WATER IS RECOVERED & USED IN COOLING TOWER TOPUP, GARDENING .

THE LIME REACTS WITH ANY IMPURITIES & FORM SULPHATES/CARBONATES SETTLE AT BOTTOM & ARE SENT TO HAZARDOUS WASTE MANAGEMENT FACILITY ALONG WITH PARTICLES ENTRAPPED IN INLET STRAINER/FILTER.

THE REST OIL IS PROCESSED FURTHER IN ATMOSPHERIC DISTILLATION/VACUUM DEHYDRATION UNIT.

THE OIL OUTPUT IS FUEL GRADE OIL

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**Lime in Water Treatment serves the following purposes:**

**Softening** - In water softening, hydrated lime is used to remove carbonate hardness from the water. Hardness caused by other calcium and magnesium salts, called noncarbonate hardness, is generally treated by means of the lime-soda process, which entails the precipitation of magnesium by lime. The co-produced calcium salt reacts with the soda ash to form a calcium carbonate precipitate. Lime enhanced softening can also be used to remove arsenic from water.

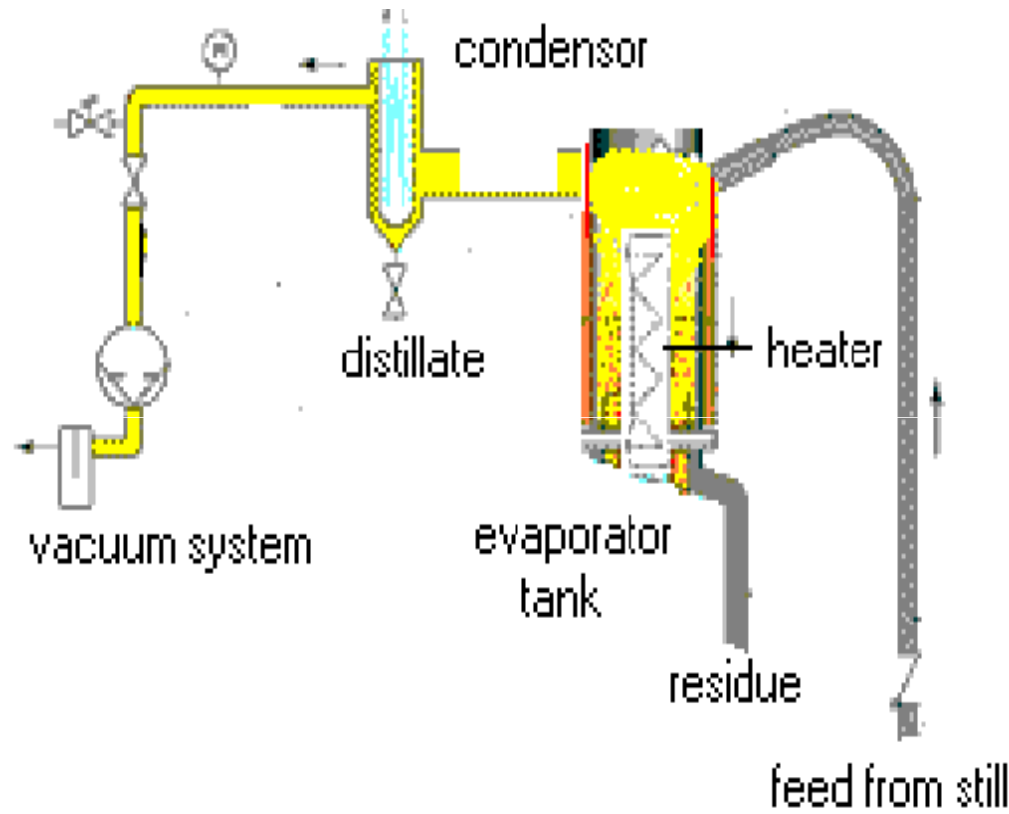
**pH Adjustment/Coagulation** - The flue gases generated along with water vapour contains CO<sub>2</sub>. The gases may mix with circulation water of water ring pump giving it white colour. Lime precipitates the CO<sub>2</sub> to form calcium carbonate. Lime is used in conjunction with alum or iron salts for coagulating suspended solids incident to the removal of turbidity from "raw" water. It serves to maintain the proper pH for most satisfactory coagulation conditions. In some water treatment plants, alum sludge is treated with lime to facilitate sludge thickening on pressure filters.

**Effect on Pathogen Growth** - By raising the pH of water to 10.5-11 through the addition of lime and retaining the water in contact with lime for 24-72 hours, lime controls the environment required for the growth of bacteria and certain viruses. This application of lime is utilized where "phenolic water" exists, because chlorine treatment tends to produce an unpalatable water due to the phenol present. This process, called "excess alkalinity treatment," also removes most heavy metals.

**Removal of Impurities** - One of the most common methods of removing silica from water is the use of dolomitic lime. The magnesium component of this lime is the active constituent in silica removal. Lime is also used to remove manganese, fluoride, organic tannins and iron from water supplies.

# WASTE OIL RECYCLING PLANT 900 MTPY

## ATMOSPHERIC DISTILLATION /DEHYDRATION TO REMOVE WATER



Atmospheric distillation plant:  
Any incoming oil will be heated in this tank to 90 to 97 °C. The water content in the oil will evaporate & will be condensed in condenser storage tank. This water is distilled water, which will be further passed through a carbon filter to remove any odour. This water will be used as top up water in cooling tank after suitable cooling to ambient temperature.



# WASTE OIL RECYCLING PLANT 900 MTPY

## ATMOSPHERIC DISTILLATION/DEHYDRATION TO REMOVE WATER



THE OIL IS SUCKED INTO BOTTOM TANK NO 1 OF 225 LITER CAPACITY  
THE OIL IS ALSO SUCKED IN TOP TANK OF 225 LITER CAPACITY UNDER VACUUM USING A 40 NB HYDRAULIC HOSE  
AFTER COMPLETE FILLING OF OIL IN THE TANKS VACUUM IS RELEASED & SYSTEM IS TAKEN TO ATMOSPHERIC PRESSURE  
THE OIL IN TOP TANK IS HEATED TO  $>95^{\circ}\text{C}$ . THE WATER EVAPORATES & CONDENSES INTO THE CONDENSOR .  
THE INTERNAL CIRCULATING WATER OF CONDENSOR OUTLET IS CIRCULATED THROUGH TANK NO 1 TO LET THE OIL SOAK UP THE HEAT OF RETURN LINE HOT WATER.  
THIS RETURN LINE HOT WATER HEATS UP THE INPUT OIL TO  $95^{\circ}\text{C}$  IN 45 MINUTES AFTER START OF INITIAL BATCH.  
THE TOP TANK AFTER REACHING  $95^{\circ}\text{C}$  IS FURTHER HEATED TO  $150^{\circ}\text{C}$  UNDER VACUUM OF 120 TORR. ALL TRACES OF DILUTENTS,WATER ,PAH ARE REMOVED & CONDENSED IN CONDENSOR.  
THEY ARE SEPERATED BY GRAVITY SEPERATION IN TANK.  
THE DEHYDRATED & MODERATELY DISTILLED OIL IS STORED IN INSULATED BOTTOM TANK NO .2 FOR FURTHER PROCESSING  
THE OIL FROM BOTTOM TANK NO 1 WHICH HAS TEMPERATURE GAIN UPTO 95 % IS TRANSFERRED VIA INSULATED PIPELINE TO TOP TANK .WHERE IT IS FURTHER HEATED TO  $150^{\circ}\text{C}$  & FURTHER PROCESS IS REPEATED.  
WHILE BOTTOM TANK NO 1 IS REFILLED WITH FRESH WASTE OIL.  
**THE TOTAL CYCLE TIME OF PROCESS IS 1 HOURS FOR PROCESSING 225 LITERS OF OIL**

# Specification for waste oil –schedule -6

- Sediment- 5 % max
- Heavy metal- 605 ppm max
- Polyaromatics hydro carbon (PAH)-6%MAX
- Total halogens -4000 ppm max
- Polychlorinated biphenyls-below detection limit