Graver Water
Division of Ecodyne

Bulletin WC-154

The Elf/Anvar Coalescer

For treatment of oily steam condensate

The Concept

In refineries, offshore production, and oil-field reflooding, process water and steam condensate can become contaminated with oil. When this happens, the oil-laden condensate can cause maintenance and operating problems in downstream equipment. And the valuable oil is wasted, since it's difficult and costly to recover.

The Elf/Anvar Coalescer is a simple, maintenance-free oil-water separator. It's a continuous process that can achieve an oil-water separation efficiency of 95% —and above. That means process steam condensate is virtually oil-free, so there's no oil carryover to the boiler. Plus, the Elf/Anvar Coalescer provides an easy, cost-effective means of recovering entrained oil.

Applications

The Elf/Anvar Coalescer is used to separate oil from steam condensate in petroleum refineries, petrochemical plants, and related industries. In addition, the process can be used to treat ballast water, oil well field produced water, and oily wastewater.

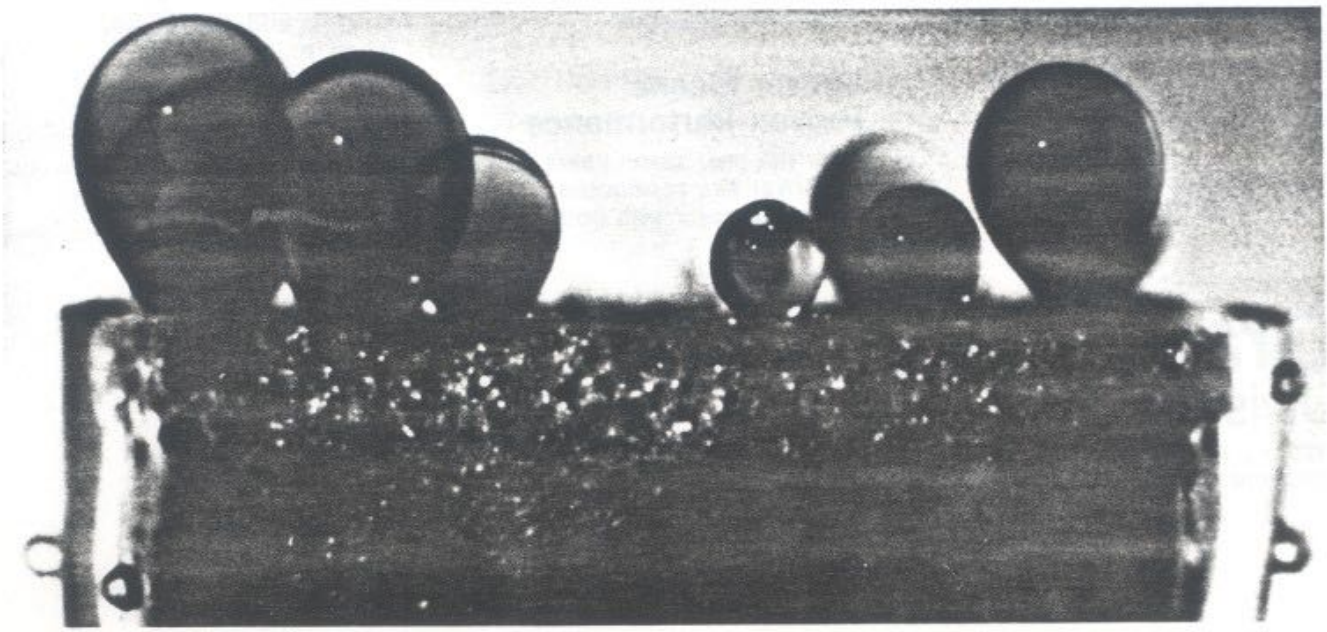
Advantages of the Graver System

Precoat-type filters are the traditional means of removing oil from petroleum refinery condensate. But these filters require frequent backwash, and the oil-saturated discharge they produce must be handled through the plant waste system.

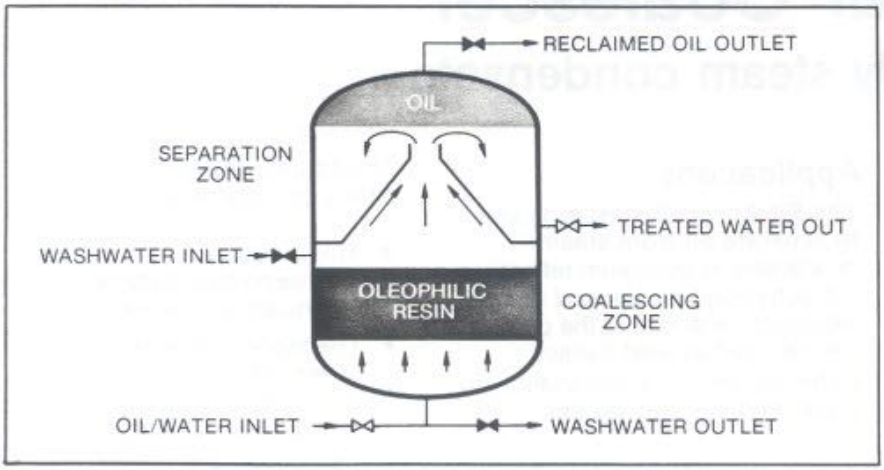
The Coalescer, on the other hand, produces a clean condensate and recovers water-free oil. No further handling or treatment of effluent water is required.

In addition, the Graver system offers you these advantages:

- The process is continuous and has no moving parts. Downtime is virtually eliminated.
- The system requires no labor or maintenance, except for occasional sample collection and gauge monitoring.
- There are no chemical feeds or backwash disposal.
- Recovered oil can easily be reprocessed.
- The system can efficiently separate a wide range of oils at varying concentrations.
- The coalescing medium is a bed of ion exchange resins that never has to be regenerated.
- The system can operate at up to 250° F with no silica throw to the boiler.
- The resins resist extremes in pH; the pH operating range is 2 to 12.



Coalesced oil drops (10,000 to 12,000 microns in diameter) disengaging from a packed bed of Graver oleophilic resin.



Here's How the System Works:

In the Elf/Anvar Process, oil-laden condensates flow upward through a packed bed of oleophilic ion exchange resins. The size of the oil droplets is 10 to 130 microns. Oil coalesces on the resin beads, forming a film. When the film becomes thick enough, it is sheared off and carried upward by the velocity of the bulk fluid flow. The unit is self-regenerating in that the resin, now free of the film, is ready to receive more oil.

The freed oil film forms drops 150 microns or more in diameter. The fluids—oil drops and steam condensate—flow out of the resin bed and through a chimney, where separation of the oil and water takes place.

Separation occurs as the momentum of the lighter oil carries it up and away from the heavier water droplets. The oil is collected in the vessel crown. It contains less than 0.5% water and is easily reclaimed for use.

The water, virtually free of oil and suspended solids, flows downward to an effluent connection where it is collected and discharged.

The usual design surface loading rate is 4 gpm/ft^2, with a maximum rate of 5 gpm/ft^2.

Also, the coalescer has a flush connection above the resin bed. This allows for reverse flushing of the bed to relieve excess differential pressure.

Graver Means Proven Performance

Over the past seven years, Elf/Anvar has conducted numerous tests with both pilot-plant and full-scale units. One of these full-scale units, an 88-gpm Elf/Anvar Coalescer, has been operating continuously for more than 5 years. The initial resin charge has never been replaced. This system takes influent condensate with an average oil concentration of 18 mg/l and produces effluent with an average oil concentration of 0.54 mg/l. That's an oil-water separation efficiency of 97%.

In tests with this system, various oils were injected into the condensate, causing the influent oil concentration to range from 400 mg/l to 2,000 mg/l. During these trials, the effluent oil content averaged less than 1 mg/l.

Graver Means Know-How in Water and Wastewater Treatment

The Graver Water Division of Ecodyne has more than 30 years' experience in the design, manufacture, and installation of equipment and systems for water and wastewater treatment.

In addition to coalescers, we make clarifiers...thickeners... filters...heaters...reverse osmosis and ultrafiltration systems... aerators and deaerators...and much, much more.

Graver offers the products, expertise, and technical support you need to help you solve your water and wastewater treatment problems.

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