

# Focus on: Treatment by Separation

The regulations require that sites treating dangerous waste [obtain a permit](#).<sup>1</sup> However, Ecology allows generators to conduct certain types of waste treatment in accumulation tanks and containers. This focus sheet explains how to treat your waste through separation.

You don't need a permit or written approval to treat dangerous waste if you comply with this guidance and our [Focus On: Treatment by Generator publication](#),<sup>2</sup> however you must notify us using the [Site Identification form](#).<sup>3</sup>

Ecology may require your site to stop treatment activities if the process poses a threat to public health or the environment. For more details about treatment by generator, see the [generator requirements](#)<sup>6</sup> in the [Dangerous Waste Regulations](#).<sup>7</sup>

If the treatment is part of an on-site wastewater treatment operation regulated under [permit by rule](#)<sup>8</sup> or the waste is being treated to meet land disposal restriction standards,<sup>9</sup> then you must comply with all other applicable federal, state, and local regulations.

## What is separation?

Separation divides mixtures of different densities into individual components. The processes apply to both:

- Mixtures of solids and liquids.
- Liquids with different densities.

## Types of separation

**Air flotation** is separating solids from liquids by attaching air bubbles to the solid particles. The solid particles and attached air bubbles rise to the surface of the liquid and collect there so you can skim them off. This process often follows flocculation.

## Related information

- [Dangerous waste treatment by generator webpage](#)<sup>4</sup>
- [Focus on: Treatment by Generator](#)<sup>2</sup>
- [Focus On: Treatment by Filtration](#)<sup>5</sup>

<sup>1</sup> <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Dangerous-waste-permits>

<sup>2</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/2004017.html>

<sup>3</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/ECY070133.html>

<sup>4</sup> <https://ecology.wa.gov/DW-treatment-by-generator>

<sup>5</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/2304048.html>

<sup>6</sup> <https://app.leg.wa.gov/WAC/default.aspx?cite=173-303-170>

<sup>7</sup> <https://app.leg.wa.gov/WAC/default.aspx?cite=173-303>

<sup>8</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/2104014.html>

<sup>9</sup> See 40 CFR 268 and WAC 173-303-140 for land disposal restriction standards.

**Centrifugation** is using centripetal acceleration to separate materials with different densities. This process is common for separating sludges from water or oil from a solid material.

**Coagulation** or **flocculation** is combining or aggregating suspended colloidal particles so they form small clumps. You can remove these combined particles using gravity sedimentation, air flotation, or [filtration](#).<sup>10</sup>

**Decanting** is actively separating materials of differing specific gravities. Once you remove the clarified supernatant (i.e. material floating on the surface), the solids are concentrated in a smaller fraction of the liquid. This process commonly follows flocculation and/or sedimentation.

**Emulsion breaking** or **demulsification** is “breaking” a stable mixture of two or more immiscible liquids that are held in suspension by emulsifying agents. Detergents and wetting agents are common emulsifiers. Demulsification separates the immiscible liquid phases and is typically followed by phase separation.

**Ion exchange** is using adsorption to remove ionic solutes from solution onto a solid substrate (such as resin beads) in exchange for other non-hazardous ions (such as calcium ions [Ca<sup>+</sup>]). This process is common for removing metal cations from wastewater.

**Oil skimming** or **phase separation** is the equivalent of decanting for liquid-liquid systems in which the liquid phases are immiscible and/or have differing specific gravities. This process can often follow demulsification.

**Precipitation** is forming an insoluble precipitate from dissolved materials, usually by adding chemical precipitants.

**Sedimentation** or **clarification** is using gravity to settle solid particles suspended in a liquid.

## What are the criteria?

To treat your waste by separation, you must:

- Make sure dangerous waste treatment in tanks complies with tank systems regulations.<sup>11</sup>
- Make sure precipitating, flocculating, and demulsifying agents don't change the chemical structure of the waste materials, other than to form precipitates.
- Not use processes that either:
  - Generate toxic or flammable gasses.
  - Volatilize dangerous waste materials directly to the air.
- Include all necessary ancillary mechanical devices—such as mixers, air spargers, and skimming devices—in the tank assessment.
- Make sure all decanting and phase separation in tanks use valves and piping that are a permanent certified part of the tank system.

## What's an example?

A site collects metal-containing solutions and uses sedimentation and flocculation to separate precipitate from the supernatant. Once they're done, they designate and properly manage both the precipitate and the supernatant; they may choose to reuse supernatant.

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<sup>10</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/2304048.html>

<sup>11</sup> See WAC 173-303-172(6) for MQGs and WAC 173-303-200(4) for LQGs.

## Where can I learn more?

For more information, please contact a dangerous waste specialist in your region's office.



<b>Southwest Region</b> 360-407-6300	<b>Northwest Region</b> 206-594-0000	<b>Central Region</b> 509-575-2490	<b>Eastern Region</b> 509-329-3400
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**Southwest Regional Office: 360-407-6300**  
Counties: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum

**Northwest Regional Office: 206-594-0000**  
Counties: Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom

**Industrial Section: 360-407-6916**

**Central Regional Office: 509-575-2490**  
Counties: Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima

**Eastern Regional Office: 509-329-3400**  
Counties: Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman

**Nuclear Waste Program: 509-372-7950**

## ADA Accessibility

To request an ADA accommodation, contact Ecology by phone at 360-407-6700 or email at [hwtrpubs@ecy.wa.gov](mailto:hwtrpubs@ecy.wa.gov), or visit [ecology.wa.gov/accessibility](http://ecology.wa.gov/accessibility). For Relay Service or TTY call 711 or 877-833-6341.