pH

About

Dispersants are chemical agents used to break up oil into smaller droplets throughout the water column. Dispersants are applied to surface oil floating on water, or below the surface closer to an uncontrolled release of crude oil from a well blowout source. This series of fact sheets details monitoring requirements and how to apply the collected data to inform the use of dispersants under **Subpart J of the National Contingency Plan (NCP)**.

Description of the Requirement

The responsible party must collect and analyze water column samples of the ambient background, baseline oil plume, and dispersed oil plume for pH, using standard operating and quality assurance procedures. Refer to the regulatory requirement in the Code of Federal Regulations (CFR): **40 CFR 300.913(b)**.

pH

pH is an indicator of water quality that describes how acidic or basic the water is. In the context of dispersant use, variations in pH can affect how the ecosystem and wildlife react to dispersants or oil. Similarly, oils and dispersants may behave differently with varying pH.

Measuring and Reporting pH

pH is measured using two primary methods: (1) colorimetric methods using acid–base indicator dyes that produce color depending on the pH of the water sample, or (2) electrochemical methods that use electrodes and a millivoltmeter (pH meter) (Figure 1). These tests measure the relative amount of free hydrogen and hydroxyl ions in the water. pH meters are the most accurate method of measurement, with small testers easy to use for fieldwork.

Data are reported on a logarithmic scale and unitless numbers: values less than seven are acidic, seven is neutral, and values greater than seven are basic (alkaline) (Figure 2).

Using pH Data

The average pH of seawater is 8.1, but responders may expect a pH from 7 to 9, depending on local conditions (Figure 2). Even small changes in pH can affect individual organisms or the ecosystem as a whole.

Spilled oil can directly affect pH, as can the oil biodegradation process. Enhanced carbon dioxide formation resulting from biodegradation of chemically dispersed oil can lower water pH.

Figure 1: A pH meter.

Credit: Getty Images

Decision Points for Responders

Responders should look for changes in pH of the dispersed oil plume compared with the non-dispersed oil plume or background. Altered pH may indicate risks to the ecosystem or signal that conditions may not be favorable for dispersant use. In consultation with subject matter experts, the On-Scene Coordinator can evaluate whether dispersant application should begin, continue, continue with modifications, or cease.

Data Collection and Reporting Frequencies

Collection

- pH data from the ambient background water column and baseline oil plume, as appropriate.
- **Daily:** pH data from the dispersed oil plume.

Reporting

- **Immediate:** Important ecological receptors' exposure to changes in pH.
- **Daily:** pH data and analyses.

Effect of variations in water pH (acidity or basicity)

Ecosystem

- Increases or decreases solubility and bioavailability of some constituents (e.g., heavy metals).
- Affects chemical or biological processes in the water, such as respiration, calcification, photosynthesis, and reproduction.

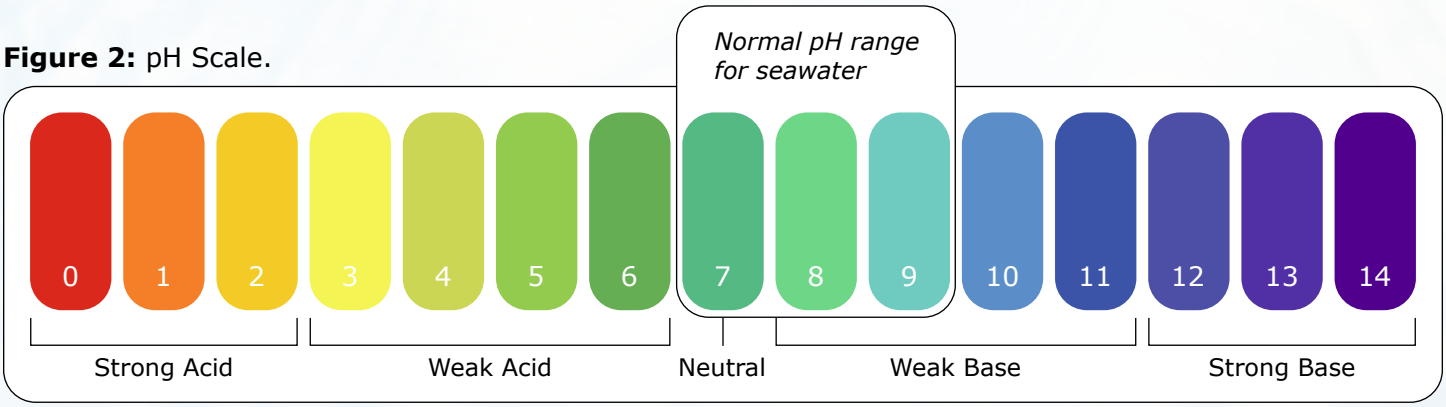
Wildlife

- Increases or decreases oil or dispersant exposures of aquatic plants and animals.
- Increases or decreases the toxicity of oil or dispersant to some species.

Dispersant/Oil

- Increases or decreases dispersant effectiveness.

Figure 2: pH Scale.



Credit: EPA

Additional Resources

NCP Product Schedule Technical Notebook

A compilation of product bulletins summarizing data requirements and test results for dispersant products listed in EPA's NCP Product Schedule. The Technical Notebook includes information on dispersant application methods, toxicity and effectiveness, and physical properties.

Oil Spill Emergency Response - Monitoring the Use of Dispersants Fact Sheets

- Water Column Sampling

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