

# Whole Cycle Tuesday

## Key Takeaway

The “smoke” rising from a compost pile during turning is simply steam—warm water vapor carrying small amounts of naturally occurring gases produced by microbial decomposition. It’s a normal, healthy part of the composting process and an indicator that your organic matter is transforming into rich, usable soil amendment.

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*"The environment is where we all meet; where we all have a mutual interest; it is the one thing all of us share."* — Lady Bird Johnson

## Why Compost Piles “Smoke” And What That Steam Really Is

Watching a compost pile being turned, whether in a backyard windrow or a commercial-scale operation, you’ve likely seen a cloud of “smoke” billow into the air. It can be a dramatic sight, like a fire smoldering beneath the surface. That cloud isn’t smoke at all. It’s *steam*, and it’s an outward sign that biology is hard at work.

### What’s Actually in That Steam?

While the visible cloud is primarily water vapor, it can carry trace amounts of gases produced during composting.

#### 1. Water Vapor (H<sub>2</sub>O) – The Main Component

This is what you see. Warm, moist air from the compost core hits cooler external temperatures and condenses into visible steam.

#### 2. Carbon Dioxide (CO<sub>2</sub>)

As microbes break down carbon-rich materials, they release CO<sub>2</sub>. It typically exits in small, non-harmful amounts mixed with the steam.

#### 3. Small Amounts of Ammonia (NH<sub>3</sub>)

Compost that is high in nitrogen (e.g., food waste, manure), you may smell a sharp odor. Ammonia is volatilizing due to high temperatures.

#### 4. Trace Volatile Organic Compounds (VOCs)

These come from biological activity and the natural breakdown of organic materials and may contribute to earthy compost odors.

#### 5. Minimal Methane or Hydrogen Sulfide (H<sub>2</sub>S) — Only if Conditions Go Anaerobic

A well-managed, oxygen-rich pile won’t produce these. If present, they indicate compaction or poor airflow, and the odor will be immediately noticeable.

### Why Steam Is Good News

A steaming pile shows:

- Active microbial breakdown
- Proper moisture levels
- Good insulation
- Successful pathogen kill temperatures
- Efficient progress toward a mature, stable compost

