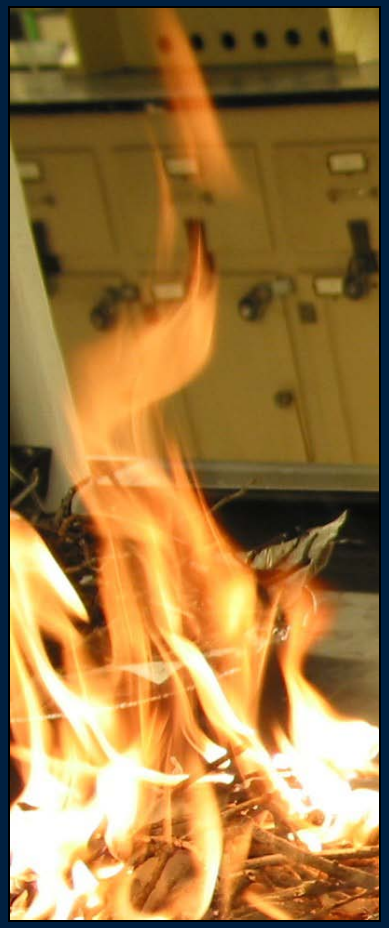
# Smoke: What is it?



- Soot

- Tar

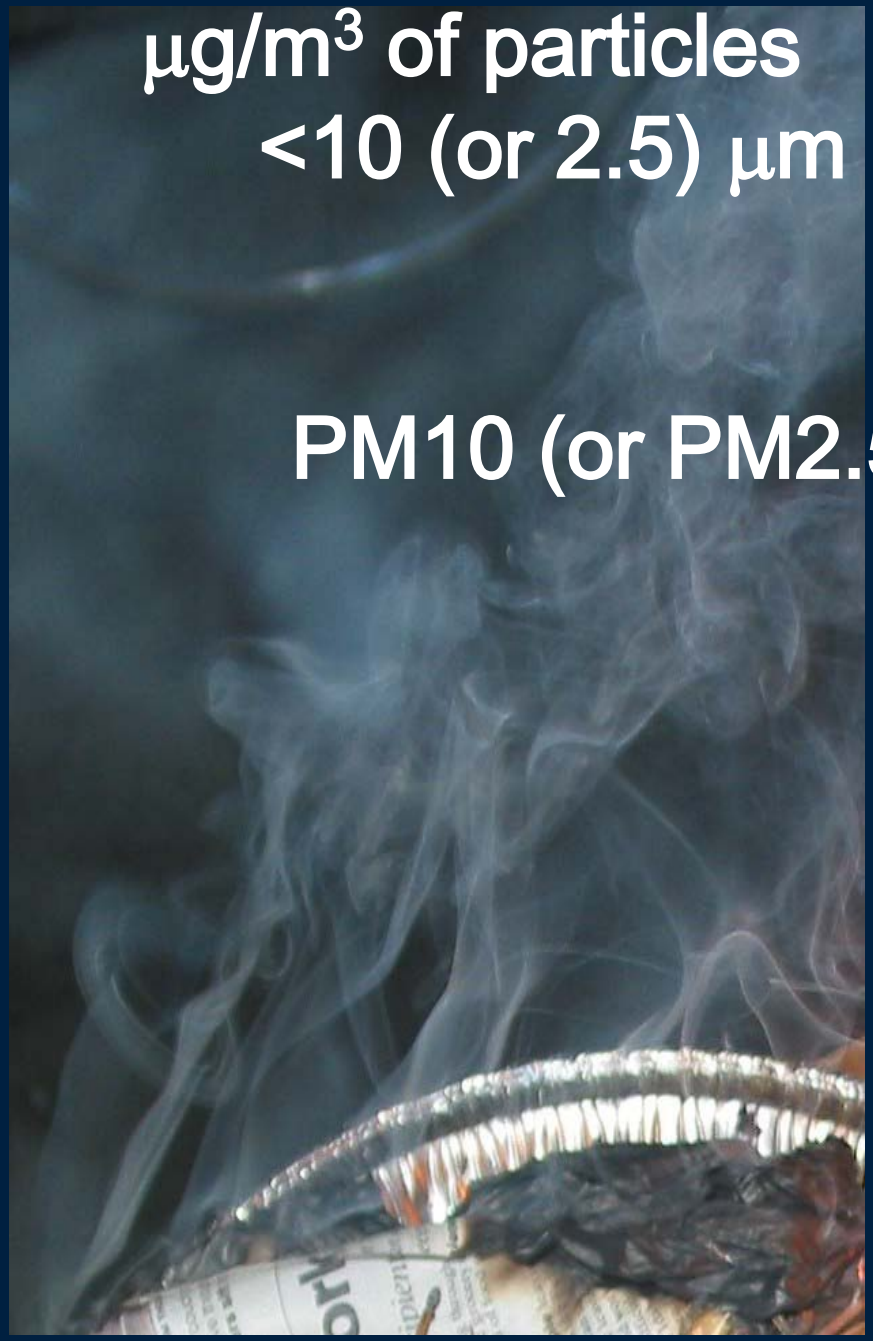
# How do we describe it?

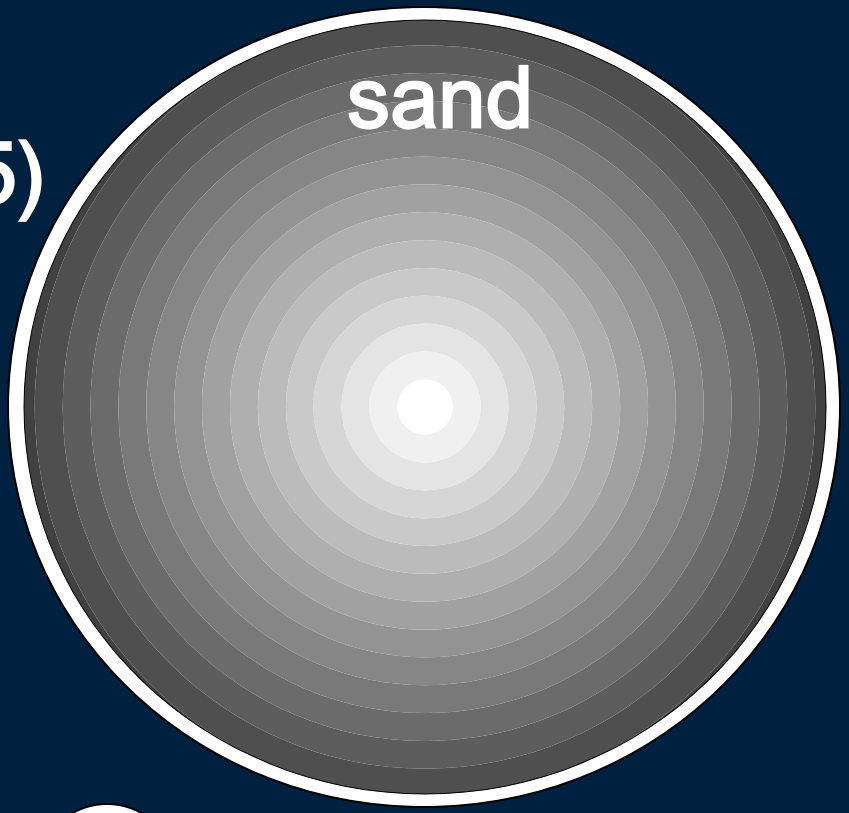
“can’t breathe…”

“can’t  see…”

μg/m$^3$ of particles
<10 (or 2.5) μm in diameter

PM10 (or PM2.5)






flour, largest PM10

largest PM2.5

~5 $\mu g/m^3$ of PM10

20 $\mu g/m^3$ of PM10

40 $\mu g/m^3$ of PM10

60 $\mu g/m^3$ of PM10

# > 80 μg/m³: Stage 1 Air alert

90 μg/m³ of PM10

# How do we measure it?

(1) $\mu g/m^3$ of particles
(2) weight of particulates produced based on fuel consumed and moisture content

# Activity 8-4 compares 4 smoke recipes:

1. 30 grams twigs, no moisture added
2. 30 g twigs, moisture added
3. 60 g twigs, no moisture added
4. 60 g twigs, moisture added

Hypothesize: Most & least fuel consumption?

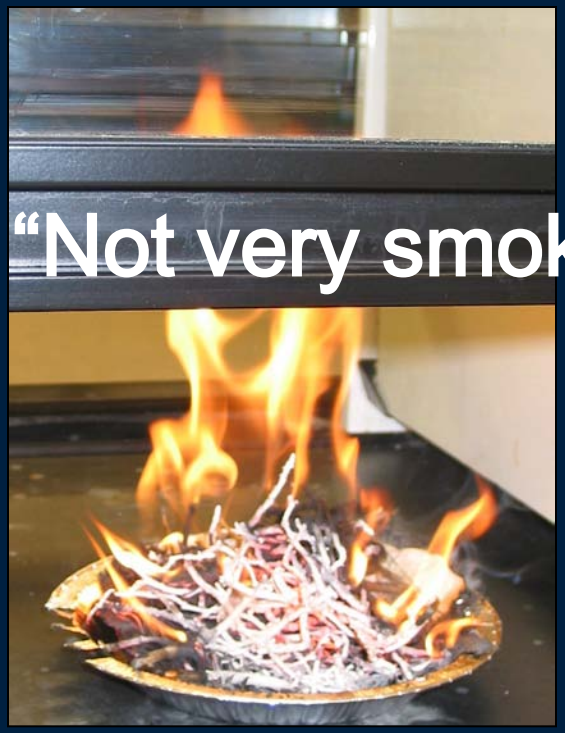
Hypothesize: Most & least smoke?

# Example– Recipe 3: Weigh & record newspaper, needle bed, twigs--

77.8 g fuel

Spray with water if needed for recipe

# Light it & observe!



"Not very smoky."

"It all burned!"

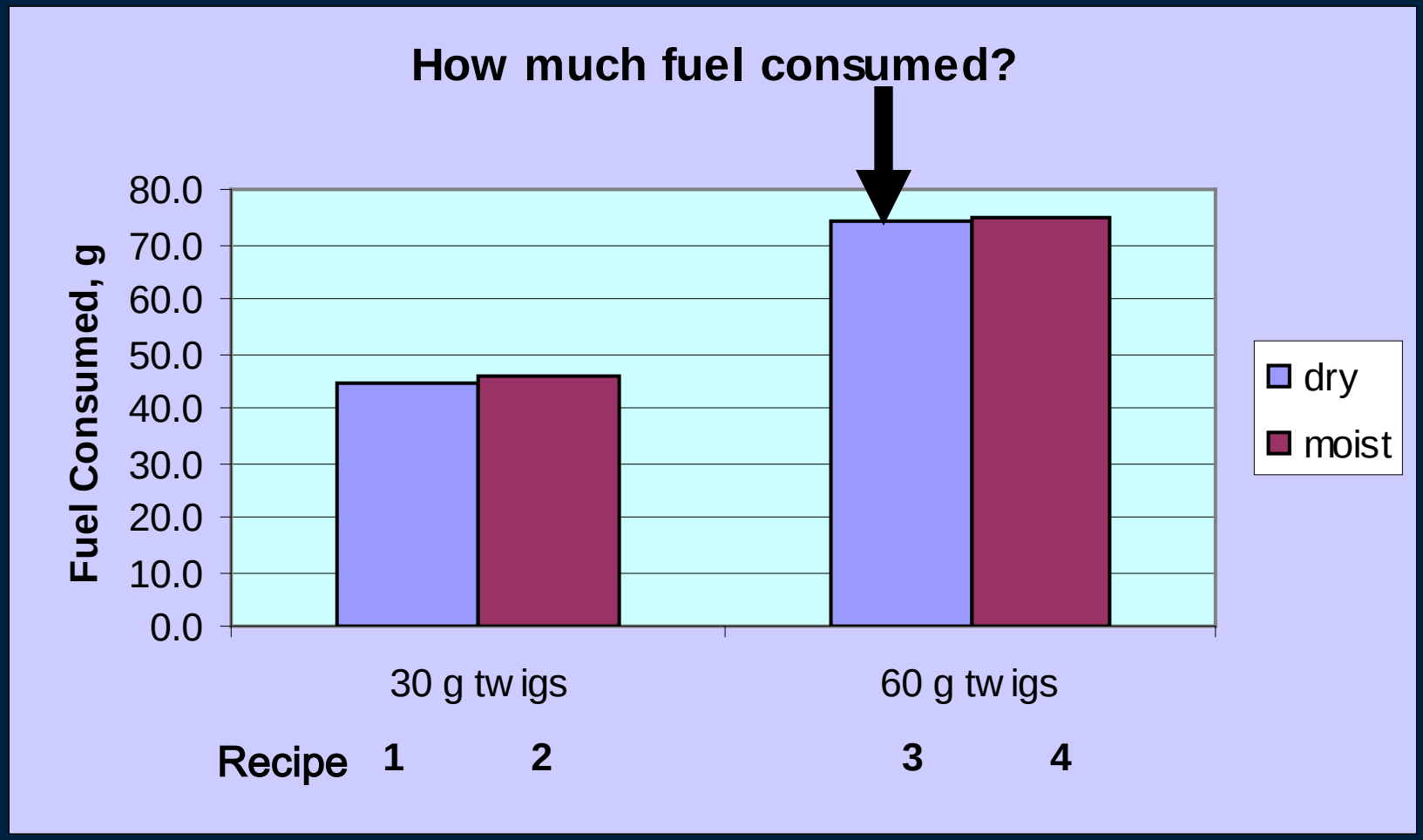
After fire is out & tray cool, weigh again.

3.5 g ash

Calculate fuel consumed:

74.3 g

# Fuel consumption from all 4 recipes:



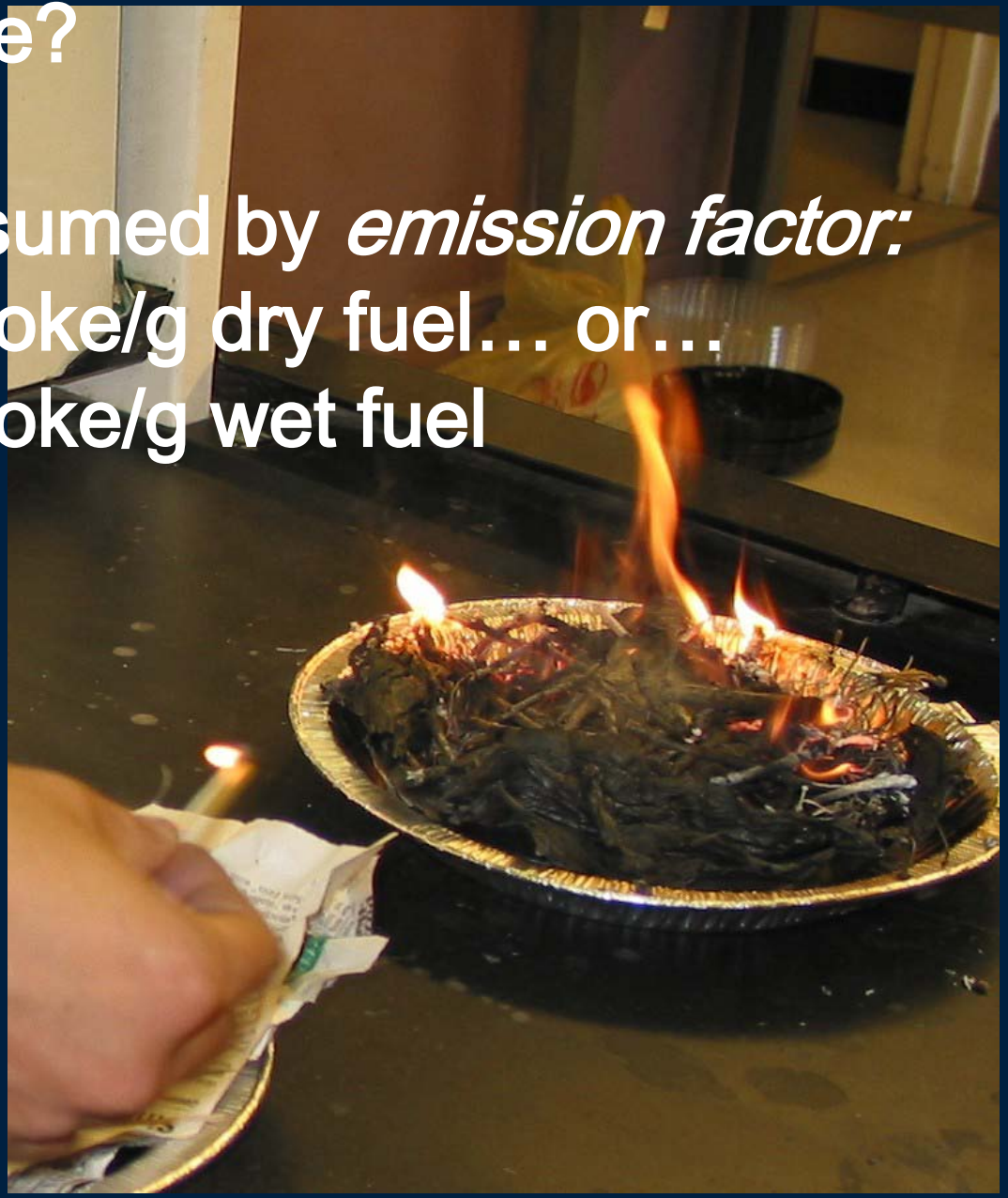

# Hypotheses: Most & least fuel consumption?

# How much smoke?

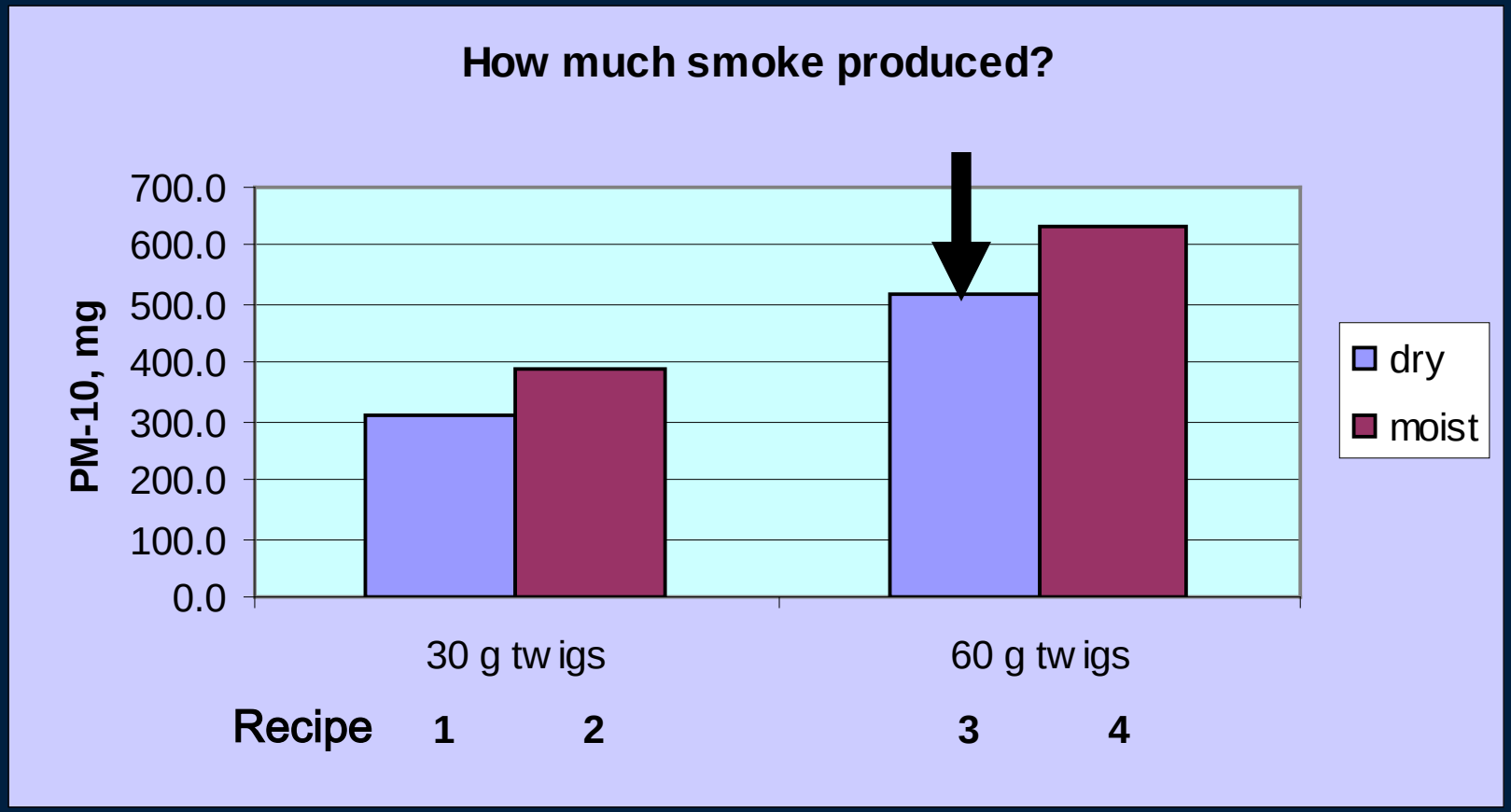
Multiply fuel consumed by *emission factor:*

→ 7.0 mg smoke/g dry fuel… or…
8.5 mg smoke/g wet fuel

520.1 mg smoke



# Smoke production from all 4 recipes:



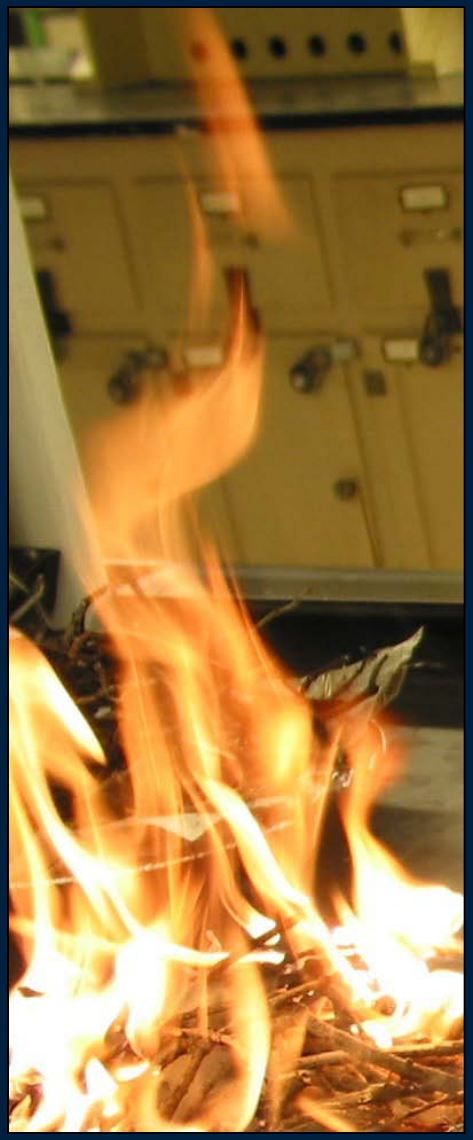

# Hypotheses: Most & least smoke?

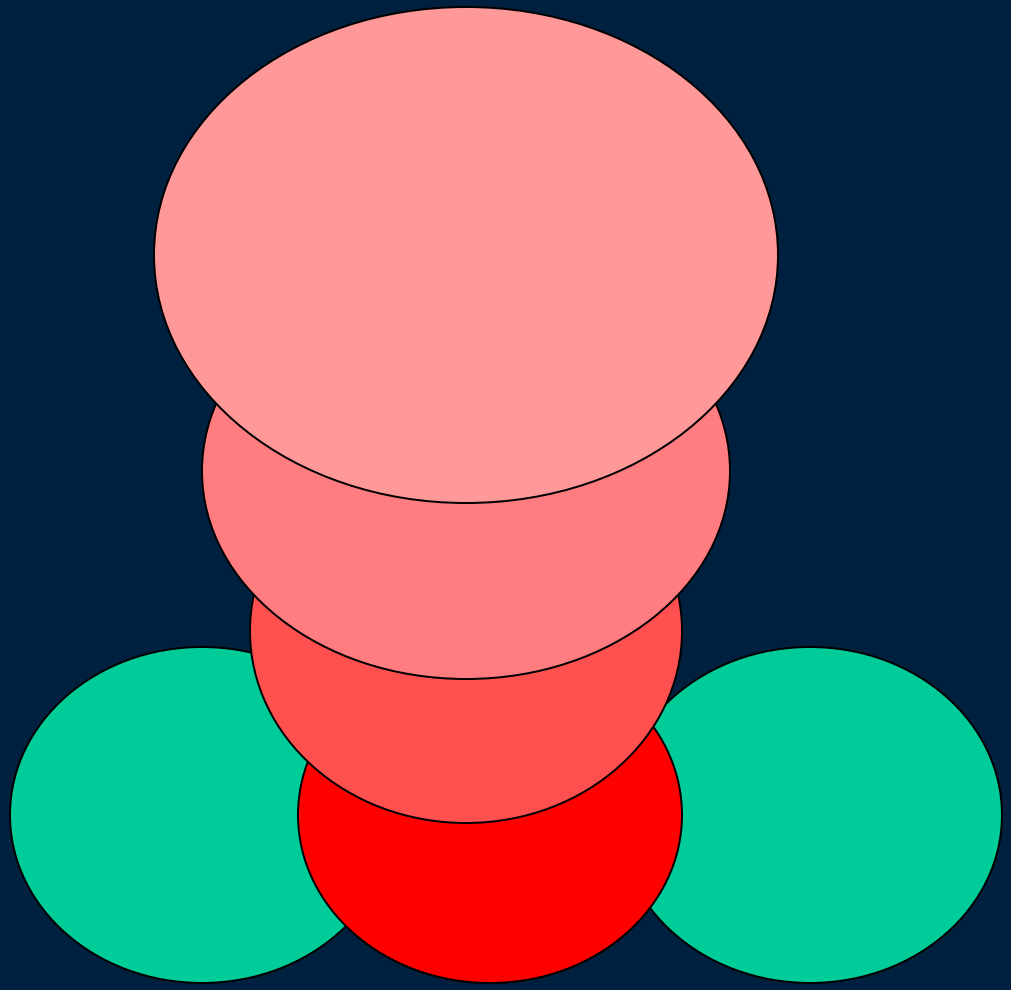
What affects smoke dispersal?

… or…

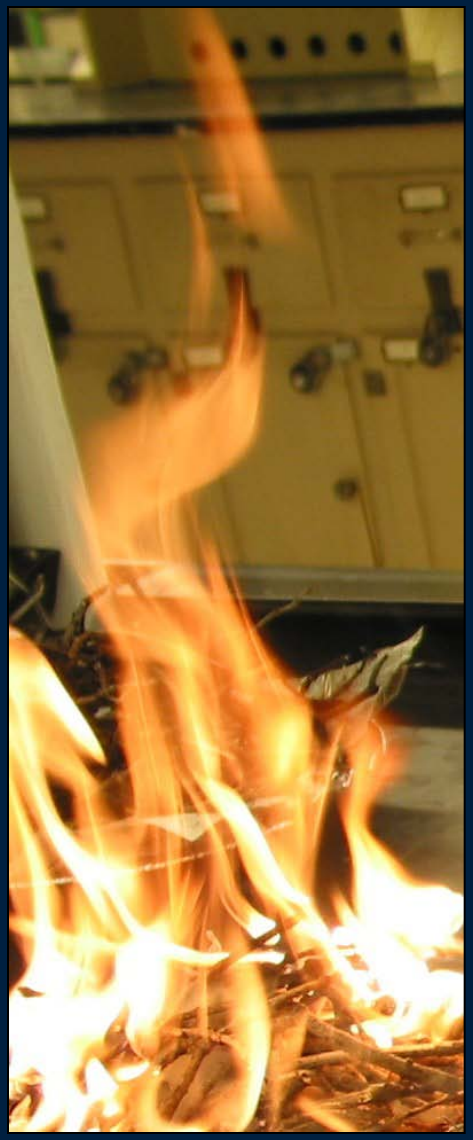
Why did I smell smoke all night?

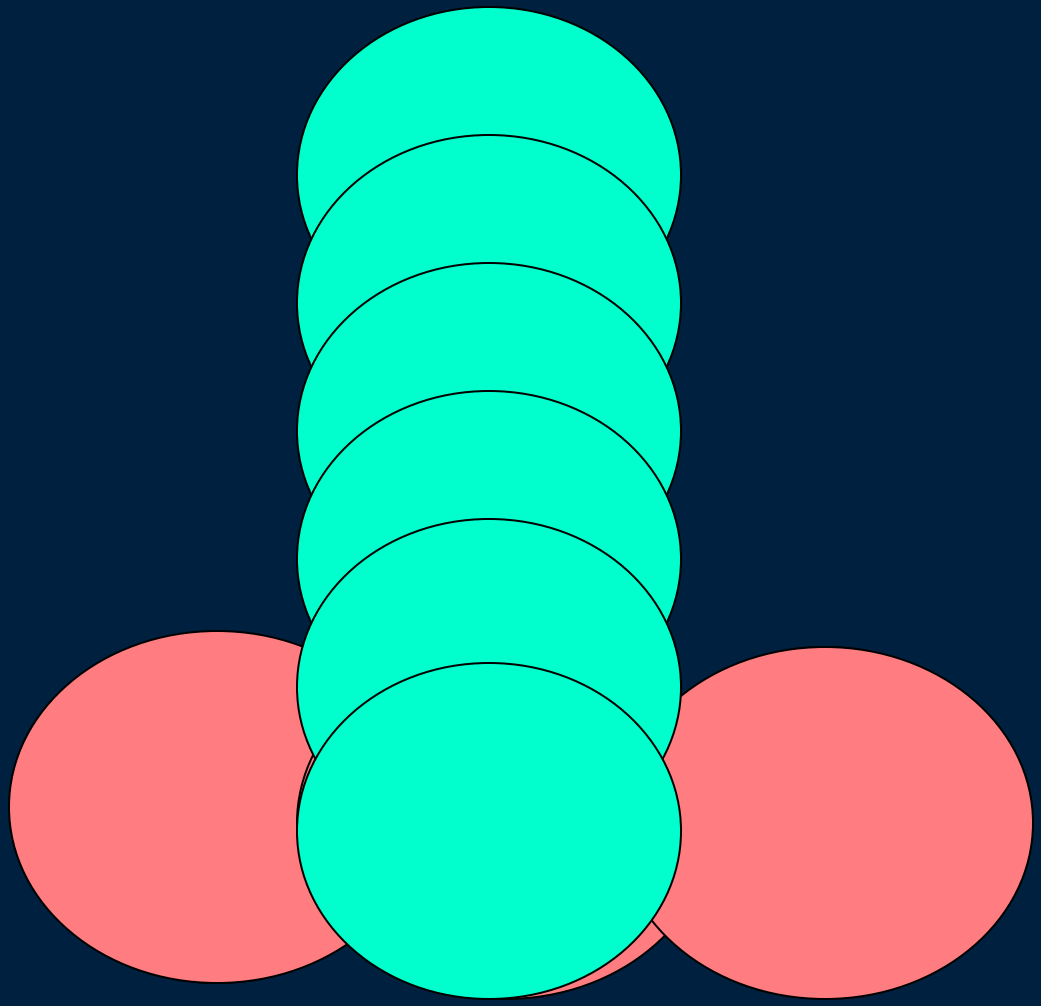
# Convection:  Warm air rises.



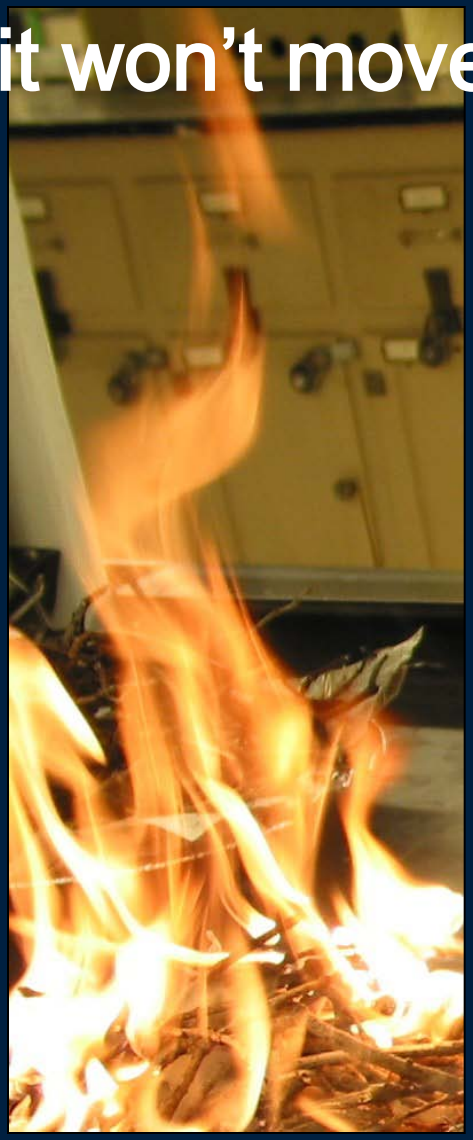


# Cold air sinks.





If cold air is under warm air,
it won't move out.



It is "stable"—

an "inversion."