

Anthropogenic Aerosol

Burning of fossil fuels does more than produce CO₂



Sulfate aerosol particles



Soot aerosol particles

From <http://picasaweb.google.com/sumi1106/ThroughMyEyes/>
and <http://climateprogress.org/2008/05/19/prius-part-2-why-hybrids-beat-diesels/>

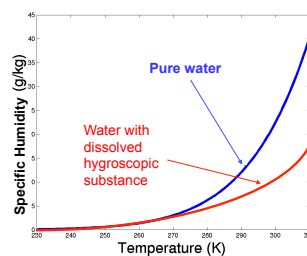
Sulfate Aerosol Particles

- Sulfur in coal and oil becomes SO₂ gas when burned, then oxidizes to SO₄²⁻
- SO₄²⁻ coagulates into sulfate particles
- Particles are hygroscopic (attract water)
- Particles scatter nearly all solar radiation
- Particles rain out within a couple weeks (and produce acid rain)

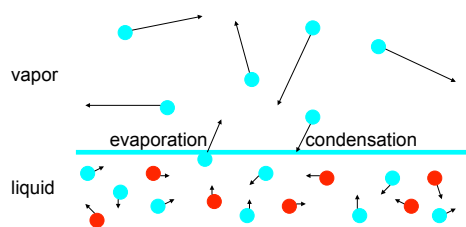
Soot Aerosol Particles

- Coal and oil produce soot particles when not fully burned
- Particles are hydrophobic (repel water)
- Particles absorb nearly all solar radiation
- Particles age (become coated with sulfate) and become more hygroscopic and less absorptive
- Particles rain out within a couple weeks

Saturation and Solutes

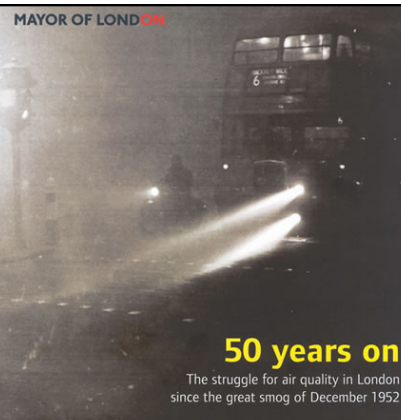


Evaporation and Condensation



Presence of solute slows evaporation, so less vapor pressure relative to pure water

London Smog



50 years on

The struggle for air quality in London since the great smog of December 1952



SMOG Chemistry

	LONDON "CLASSICAL"	Los Angeles "photochemical"
Key Pollutants	Coal SMOke (SO ₂)	Auto exhaust (CO, NO _x , ROG)
Meteorology	Stagnant air Humidity (fOG)	Stagnant air Sunlight (hv)
Chemistry	SO ₂ +.... →H ₂ SO ₄	NO _x +ROG+hv →O ₃ +SOA

