

## Automobile Air Pollution

- Most air pollution is emitted from fixed and mobile sources at ground level.
  - Gases emitted by autos
    - CO
    - NO<sub>x</sub> (NO and NO<sub>2</sub>)
    - VOC (volatile organic compounds, from gasoline and cars)
  - SPM (suspended particulate matter) – particulates and aerosols
- Main harmful ingredient in smog is ozone.
  - Ozone is formed when UV radiation, high temperatures, Nitrogen oxides, and VOCs combine. Ozone is primarily a summer problem in the US.
- Acid rain is formed from NO<sub>2</sub> pollution.
  - Nitric acid (HNO<sub>3</sub>) is formed and precipitated on vegetation in lakes and streams.
- EPA created in 1970
- Six Criteria Pollutants
  - Carbon Monoxide
  - Nitrogen dioxide
  - Sulfur dioxide
  - Lead
  - Particulate Matter
  - Ozone
- Most areas of the US have achieved attainment status – have healthy air.
- Most Areas with unhealthy air have problems with ozone and/or particulates

<i>Automobile Emission Standards Set by EPA (g/mile)</i>			
<i>Pollutant</i>	<i>1975</i>	<i>1990</i>	<i>1998</i>
VOC	3.4	0.41	0.25
NO <sub>x</sub>	3.1	1.0	0.40
CO	34	3.4	3.4

- Catalytic Converter
  - Converts VOC, CO, NO<sub>x</sub> -> H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>
  - Catalysts are platinum, palladium, rhodium.
  - Add \$500 to cost of car.
- Automobile emission standards are an example of the “**Command and Control**” strategy.
- Emission standards are set and enforced by EPA.

<i>Annual Emission by On-Road Vehicles (Million Tons)</i>			
<i>Pollutant</i>	<i>1970</i>	<i>2001 (no CAA)</i>	<i>2001 (Actual)</i>
VOC	17	41	5
NO <sub>x</sub>	12	28	8
CO	163	400	75