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Read pages 414-427 and watch the Bozeman video to answer the following questions:

Bozeman Air pollution: https://www.youtube.com/watch?v=_dTtvtlct9k

1. Name the primary pollutants

VOCs(Volatile organic Compounds) like formaldehyde/gasoline/anything that is organic and can diffuse into the environment, Carbon Monoxide(CO) an odorless gas, NOx(nitric oxide and nitrogen dioxide), SO2(sulfur dioxide) produced through the combustion of coal, PM(Particulate matter) suspended solids, lead.

Primary pollutants are produced by the source themselves. They can combine with other chemicals in the atmosphere and produce secondary pollutants.

2. Name the secondary pollutants

HNO3(Nitric acid), H2SO2(sulfuric acid), O3(Ozone). HNO3(Nitric acid) and H2SO2(sulfuric acid) can produce acid rain(Acid deposition). If we combine a lot of primary and secondary pollutants then we can have smog

3. What causes sulfuric acid and nitric acid to be formed:

NOx(nitric oxide and nitrogen dioxide) can produce nitric acid and sulfur dioxide can produce sulfuric acid.

4. Use the chemical formulas to show how Nitrous Oxide and Sulfur Dioxide are changed into Secondary Pollutants.

NOx + H3 = HNO3
SO2 + H2 = H2SO2

5. What happens to the sulfuric acid and nitric acid in the atmosphere?
   Sulfuric acid and nitric acid when combined can produce acid rain or acid deposition.

6. What are some environmental consequences to Acid Rain?

Harm organisms and wildlife, dissolve structures and change pH in the whole food web and can impact living systems.

7. What causes the secondary pollutant tropospheric Ozone to be formed: show and explain the process.
   Ozone can be produced through the sun and nitrogen dioxide.

Sun + NOx = O3

8. A thermal inversion occurs when a relatively warm layer of air at mid-altitude covers a layer of colder air below. What is the environmental consequence of a thermal inversion? What cities are vulnerable to an inversion??
   .Mexico City

9. What is smog?

NOx compounds and the Ozone.
NO_2 ---> NO + O
O_2 + O ----> O_3

10. What is photochemical smog?

Caused by NOx, VOCs and the sun.
NO_2 ---> NO + O
O_2 + O ----> O_3

11. Where is smog commonly found?

Areas where there's sunlight, VOCs and NO_2 like Los Angeles, where all these come together to create smog.

12. How can smog be prevented?

Prevent the amount of nitrogen dioxide and we prevent the amount of volatile organic compounds in the atmosphere. In order to eliminate air pollution we do that through legislation, so we have restrictions on the amount of pollutants like in the Clean Air Act of 1970.

13. How are VOC's involved in the formation of tropospheric ozone?
    When primary pollutants such as VOCs, NOx, CO react in the atmosphere in the present of sunlight. They created tropospheric ozone.

14. Which pollutants are regulated by the Clean Air Act?
    The Clean Air Act put strict standards in SO_2, CO, PM, NOx, Lead and O_3.

15. What pollutant isn't regulated but probably should be?? VOCs, HNO_3 and H_2SO_2.

16. Describe the way that the following technology controls emissions:
    a. catalytic converter, Grabbing onto the nitrogen dioxide and carbon monoxide that is produced in combustion.
    b. wet scrubber, As the polluted air goes in, we have a mist eliminator, the water will garb onto a lot of those chemicals. They'll move down into this packing material and then the clean air is going to go out the other side.
    c. fluidized bed combustors used to burn solid fuels. In its most basic form, fuel particles are suspended in a hot, bubbling fluidity bed of ash and other particulate materials through which jets of air are blown to provide the oxygen required for combustion or gasification
    d. electrostatic precipitators. They produce a gradient and it grabs on to some of these pollutants.