

COLUMBUS STATE COMMUNITY COLLEGE

ESSH 1101 - Introduction to Environmental Science, Safety & Health

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Homework 8 – The Atmosphere and Air Pollution

Environmental Science, 16th Ed. by Tyler and Spoolman – Chapter 15

1. What factors are used to determine the separate layers of the atmosphere?
 - The separate layers of the atmosphere are determined mostly by temperature. Other contributing factors are altitude and pressure
2. What is ambient air (the air in the troposphere) made up of?
 - Ambient air in the troposphere is comprised of:
 - Nitrogen (78%)
 - Oxygen (21%)
 - Argon (0.93%)
 - Carbon Dioxide (CO₂) (0.040%)
 - The rest of the troposphere is comprised of:
 - Water vapor (H₂O)
 - Soot
 - Methane (CH₄)
 - Ozone (O₃)
 - Nitrous Oxide (N₂O)
 - Several of the gases found in the troposphere are considered greenhouse gases (H₂O, CO₂, CH₄, N₂O)
3. Give two examples of a stationary air pollution source and two examples of a mobile air pollution source.
 - Stationary air pollution sources would be an industrial, power, or cement plant.
 - Mobile air pollution sources would be cars, trucks, motorcycles, farm equipment, etc.
4. List four potential human health or natural resource impacts of air pollution.
 - Potential human health or natural resource impacts from air pollution include:
 - Asthma
 - Chronic Bronchitis
 - Emphysema
 - Smog → can lead to additional respiratory
 - Acid rain → acidic soil and water

5. What are the differences between primary and secondary air pollutants? Give one example of each.
 - Primary air pollutants are chemicals or substances emitted directly into the air from natural processes and human activities at concentrations high enough to cause harm.
 - Secondary air pollutants are pollutants that are derived by primary pollutants reacting to one another and with other natural components to form new harmful chemicals.
6. Differentiate between industrial smog and photochemical smog, by describing the differences in their causes.
 - Industrial smog is essentially generated from the burning of coal. It mostly consists of an unhealthy mix of sulfur dioxide, suspended droplets of sulfuric acid, and a variety of suspended solid particles.
 - Photochemical smog is a mixture of primary and secondary pollutants formed under the influence of UV radiation from the sun. Morning commuters car exhaust mixes in complex ways to combine with industrial exhaust and pollutants which is then heated by the rising sun.
7. What is a temperature inversion and what factors lead to its formation?
 - Normally, as the sun warms the earth's surface, the air is warmed and rises which carries pollutants into the upper atmosphere. However, under certain atmospheric circumstances, a layer of warm air can lay atop the colder ground air. This is a temperature inversion. When this occurs, the colder air won't rise through and mix with the warmer air above. Harmful pollutants can accumulate in this colder air layer to the point of being harmful and possibly lethal.
8. What is the primary cause of acid deposition? What environmental damages or problems can be caused by acid deposition?
 - Acid deposition is the result of industrial pollution from coal fired plants, metal ore smelters, oil refineries, and other industrial facilities. Exhaust from these facilities mixes with secondary pollutants to form new, more acidic compounds. The resulting mixture is referred to as acid deposition, or acid rain.
 - Acid rain can adversely affect soil, water, and foliage (crops and trees) downwind of the pollution sources.

9. Why in some ways is indoor air pollution more of a health problem for most Americans than outdoor air pollution?

- Indoor air pollution can be a bigger problem due to the static nature of people who spend most of their lives indoors (work, sleep, tv, video games, etc.)

10. Briefly explain the difference between weather and climate.

- Weather refers to short term changes in atmospheric variables.
- Climate refers to atmospheric condition over an area for longer stretches of time.
 - Scientists prefer not to look beyond the last 30 years because it damages their climate change claims.
 - Scientists prefer to continue to manipulate their data to support their pre-determined conclusions in an effort to continue to maintain their funding streams.
 - Scientists avoid the generation of climate models that utilize non-manipulated data (the Russian model) where the result dismisses climate change as a politically expedient hoax.

11. What is the greenhouse effect, and what is the cause of it? Is this primarily a natural or human-induced effect?

- The greenhouse effect is a natural process that has a role in determining the earth's average atmospheric temperature.

12. Summarize the scientific data that climate change is due to human activity.

- Agree to disagree. While it is true that the burning of fossil fuels has had a very minor impact on the earth's climate, the bulk of the climate changes we are experiencing are more likely due to the 9 naturally occurring factors, and others, as outlined on pg420 of our text.
 1. Volcanic eruptions (less of an issue now, but still valid)
 2. Changes in solar input
 3. Changes in the earth's elliptical orbit around the sun
 4. Changes in the tilt of the earth's axis
 5. Changes in the earth's wobbly orbit around the sun
 6. Changes in global air circulation
 7. Changes in the amount of planetary ice
 8. Changes in the amount of greenhouse gas
 9. Changes in ocean currents

However, in an effort to maintain my grade, I will spout the Marxist, New World Order, open borders, climate change crowd's nonsense. Here goes:

- Human activity and pollution, only since 1975 mind you – which I find oddly peculiar (see pg421, first column, line 8), has been enhancing the natural greenhouse gas effect on the planet. As atmospheric levels of CO₂ rise, the gas becomes a pollutant that plays a role in the climate change and its harmful environmental, health, and economic effects.
- The burning of fossil fuels has increased the earth's average atmospheric temperature and played an important role in climate change taking place since 1975.

13. What have humans put into the atmosphere that is believed to have caused depletion in the stratospheric ozone? Give two potential effects of such depletion.

- Humans have generated more carbon dioxide (CO₂) and methane (CH₄), among other gases, and they have affected the stratospheric ozone.
- Potential effects of ozone depletion are animal migrations, more harmful UV rays reaching the earth's surface, negative ecosystem and biosphere impacts.