Section 2D Review

Name_____

Pollutants:

1) What is the difference between a primary air pollutant and a secondary air pollutant?

A primary pollutant is a pollutant that is produced directly by humans or natural sources.
A secondary pollutant is a substance that reacts with something in the air to produce a pollutant.

2) Give an example of a human pollutant and a natural pollutant.

Human pollutant - SO_2, VOCs
Natural pollutant - CO_2, PM_{10}

3) What are criteria pollutants?

Criteria pollutants are the common pollutants in the air. They include NO_2, PM_{10}, $PM_{2.5}$, ozone, CO, and SO_2

4) List five common sources of air pollutants. Rank them from most to least pollutant.

1) transportation
2) natural sources
3) farming
4) factories
5) power plants

5) Describe four effects of air pollution.

Difficulties breathing, increased greenhouse effect, smog, acid rain

6) Describe particulate pollution.

Particles in the air that are between 2.5 and 10 microns, that act as dust that can react to form smog.

7) Does smog occur during the day or at night? Why?

Smog occurs during the day, when sunlight gives the pollutants in the air enough energy to react to form smog. Smog is made from sunlight reacting VOCs, CO and NO_X together to form the smog.

8) What are the reactants for smog?

VOCs, CO, NO_X and O_2

9) What are the products of smog?

Nitrous oxides, carbon dioxide, ozone, water and other VOCs

10) What is photochemical smog? Explain why its name is an accurate description.

Photochemical smog is smog that is activated to be made by sunlight. The sunlight makes the pollutants in the air react to form the smog. The smog looks like a smoke/fog mixture.

Acid Rain:

11) Classify each sample as acidic, basic or neutral.

Seawater, pH = 8.6 basic
Drain cleaner, pH = 13 basic
Vinegar, pH = 2.7 acidic
Pure water, pH = 7.0 neutral

12) What is the approximate pH of typical rain water? Does acid rain have a higher or lower pH?

Typical rain water has a pH around 5.6. Anything below 5 in pH is considered as acid rain.

13) What are the major acidic components in acid rain?

CO_2, SO_2 or NO_X reacting with water to form the acid.

14) Why is acid rain considered a secondary pollutant?

Acid rain is not formed directly by pollution sources. Acid rain forms when pollutants react with water in the air to create an acid. This acid falls then with the rain/precipitation. An example of the reaction is:

$H_2O + SO_2 \rightarrow H_2SO_3$

15) What effects does acid rain have on plant life and building structures. Be specific.

Acid rain can destroy cells within plant life, making it die. Acid rain can react with metals and limestone structures to cause it to erode.

16) Why is the presence of ozone regarded as a problem at ground level, while the absence of ozone is regarded as a problem in the stratosphere?

Ozone in the stratosphere is needed to block/absorb ultraviolet radiation to protect us. Ozone near the surface is a secondary pollutant that is a component of smog and can corrode metals or cause respiratory issues.

17) A smokestack has been shown to contribute toward the production of acid rain. Three samples are taken. Sample 1 is taken in the immediate vicinity of the smoke stack. Sample 2 is taken upwind of the smokestack and sample three is taken downwind of the smokestack. List the samples in the order you would expect to find the rain, from most acidic to least acidic.

Acid rain needs time to react to form in the air. Therefore, the most acidic rain will be downwind (Sample 3) from the smokestack, less acidic at the smokestack (Sample 1), and even less acidic upwind from the smokestack (Sample 2)