What is Environmental Chemistry?

Worksheet

Environmental chemistry applies chemical knowledge to environmental problems: analyzing pollutants, understanding transformation reactions, and designing cleanup methods for a sustainable world.

Questions

1. Which gas is the leading contributor to acid rain?

A) CO
B) SO
C) O
D) N

2. Bioaccumulation is a process where

A) pollutants dissolve in water
B) toxins concentrate in organisms over time
C) pollution increases rainfall
D) plants clean the air

3. What does ppm mean in water quality?

A) Particles per minute
B) Parts per million
C) Pressure per meter
D) Power per molecule

4. Which refrigerant damaged the ozone layer?

A) CO
B) CFCs
C) NO
D) CH

5. A factory emits 100 kg SO daily. How much HSO acid rain can form if all SO is oxidized and dissolves in water? (Molar mass SO = 64, HSO = 98 g/mol)

6. A 50 mL water sample contains 0.5 mg Pb ions. Calculate the concentration in ppm (parts per million). (Assume water density = 1 g/mL)

7. An aquifer has 200 ppm NO contamination. How many kg of NO are in 1 million liters of water?

8. Define: What is environmental chemistry?

9. Define: What is bioaccumulation?

10. Define: What is acid rain?

Answer Key

1. B) SO - SO from fossil fuel combustion oxidizes to SO, then forms HSO in clouds.

2. B) toxins concentrate in organisms over time - Persistent toxins are not broken down and accumulate in body tissues, especially in predators.

3. B) Parts per million - ppm = mg of solute per kg of solution, a common unit for low pollutant concentrations.

4. B) CFCs - Chlorofluorocarbons (CFCs) release Cl radicals that catalyze ozone destruction in the stratosphere.

5. Moles of SO = 100,000 g / 64 g/mol = 1,562.5 mol 2 SO + O 2 SO; SO + HO HSO From stoichiometry: 1 mol SO 1 mol HSO Moles of HSO = 1,562.5 mol Mass of HSO = 1,562.5 98 = 153,125 g 153 kg

6. Mass of water = 50 mL 1 g/mL = 50 g ppm = (mass of pollutant / mass of water) 10 ppm = (0.5 mg / 50,000 mg) 10 = 10 ppm

7. 200 ppm = 200 mg pollutant per 1000 g water 1 million liters = 10 g water Mass of NO = (200 mg / 1000 g) 10 g = 200 10 mg = 200 kg

8. The study of chemical processes in air, water and soil, and how pollutants harm the environment.

9. Toxins concentrate in organisms over time and increase up the food chain (biomagnification).

10. Rain with low pH caused by SO and NO_x gases forming acids in the atmosphere.