

# Grade 9 Environmental Chemistry Practice Questions



"Harold, you moron, you're standing on smog!"

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"Jack, we could stop falling down this stupid hill if you'd stop worrying about contaminants in our tap water."

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1. Which of the following actions would increase the amount of usable nitrogen in the soil?
  - a. Decomposition
  - b. Plant absorption
  - c. Lightning strikes
  - d. Cellular respiration
  
2. Certain bacteria have the ability to convert nitrogen into other forms. The term associated with this process is
  - a. nitrogen fixation.
  - b. decomposition.
  - c. nitrification.
  - d. respiration.
  
3. Which of the following human activities, that impact our environment, has Strathcona County focused on reducing during the last year?
  - a. Wastewater runoff
  - b. Industrial processes
  - c. Agricultural activities
  - d. Solid waste production
  
4. Over the past 15 years, a farmer kept careful crop production records. He noticed that the crop yield increased when he used an insecticide for controlling the grasshopper problem, but only for the first 10 years. The insecticide did not seem to work after that. The most probable reason that the farmer needed to use a higher concentration of insecticide after the 10 year period is that the insects
  - a. reproduced more quickly to replace those killed by the insecticide.
  - b. increased in size and weight and became more tolerant of the insecticide.
  - c. were not affected by the insecticide because it was absorbed into the soil.
  - d. that survived the previous applications passed their resistance to that concentration on to their offspring.
  
5. A chemistry experiment calls for the use of lemon and baking soda. Prior to starting the experiment, Dillon informs his lab partner that
  - a. both lemon and baking soda are acids.
  - b. both lemon and baking soda are bases.
  - c. lemon is an acid and baking soda is a base.
  - d. lemon is a base and baking soda is an acid.
  
6. People swimming in the Jensen's pool have been complaining of skin irritation. A litmus test done by Mr. Jensen indicated that the water was acidic. In order to neutralize the water in the pool Mr. Jensen should add a solution of
  - a. acidic carbonic water.
  - b. neutral distilled water.
  - c. basic sodium carbonate.
  - d. chlorinated aqueous solution.
  
7. pH paper is a better choice for determining the acidity of a solution than litmus paper because
  - a. pH paper is more economical to buy.
  - b. pH paper shows the degree of acidity.
  - c. pH paper turns a brighter colour in an acidic solution.
  - d. pH paper is more readily available than is litmus paper.

**Use the information below to answer the next question**

To study the effect of campground activity on soil pH, an environmental scientist took soil samples from four different sites before, during, and after the activities. The chart shows the data collected.

**“Soil pH levels before, during and after Campground activities”**

Site	Before	During	After
1	7.6	7.1	6.4
2	7.8	7.5	6.9
3	7.4	7.1	6.9
4	7.2	7.1	7.0

8. The environmental scientist concluded that the activity in the camp caused the soil to become more
- polluted.
  - neutral.
  - acidic.
  - basic.

**Use the following information to answer the next question**

Living organisms are compared in two ponds with different water pH levels.

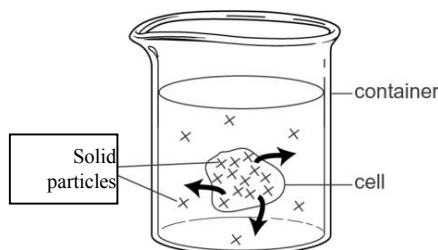
Pond A pH 6.8

Pond B pH 5.6

9. Pond B most likely has
- more organisms and a lower diversity of species.
  - fewer organisms and a lower diversity of species.
  - more organisms and a greater diversity of species.
  - fewer organisms and a greater diversity of species.
10. The element selenium is required in very small amounts by the human body. Such a nutrient would be classified as
- a micronutrient.
  - a macronutrient.
  - an optimum nutrient.
  - an unessential nutrient.

11. All organic compounds have the element \_\_\_\_ in their structure.
- carbon
  - oxygen
  - nitrogen
  - hydrogen
12. Nitrogen compounds are converted by the bodies of living things into a useful substance called a
- fat.
  - protein.
  - vitamin.
  - carbohydrate.
13. Oils belong to a group of organic compounds called
- lipids.
  - proteins.
  - starches.
  - carbohydrates.
14. When water is used in a reaction breakdown large organic molecules into smaller ones our bodies can use, it is called...
- active transport.
  - photosynthesis.
  - hydrolysis.
  - ingestion.

**Use the following information to answer the next question**



15. The process by which the solute particles are moving out of the cell is
- active transport because they are moving from a high concentration to a low concentration.
  - active transport because they are moving from a low concentration to a high concentration.
  - passive transport because they are moving from a low concentration to a high concentration.
  - passive transport because they are moving from a high concentration to a low concentration.
- 
16. Which of the following statements refers to a substrate?
- The clean water which flows into a river from a waste treatment plant.
  - The solid produced by two chemicals in solution when they react.
  - The part of the environment in/on which an organism lives.
  - The process in which a solid changes directly into a gas.

17. Five parts vinegar is mixed with 995 parts water. The concentration of the vinegar-water solution is equal to
- 5 ppm.
  - 50 ppm.
  - 500 ppm.
  - 5000 ppm.
18. The LD<sub>50</sub> for mercury (II) cyanide in mice is 33mg/kg. What would be the result of 200 laboratory mice orally ingesting 33mg/kg of Hg(CN)<sub>2</sub>?
- 33 of them would die
  - 100 of them would die
  - 200 of them would die
  - It is impossible to predict what would happen.
19. Phosphorus and nitrogen rich fertilizers leaching into the water system from nearby farms can have a long term effect on the health of an aquatic ecosystem because
- the chemicals are poisonous and will kill the pond plants and animals.
  - the chemicals cause plants to grow rapidly and produce too much oxygen.
  - the chemicals react with the water to form acid rain which will kill the pond plants and animals.
  - the chemicals cause plants to grow rapidly, blocking out the sun and depleting oxygen levels as they decay.
20. Biomagnification is a process...
- where pollutants build up in the tissues of organisms and move up along the food chain.
  - that creates algal blooms with increased nutrient flow into water systems.
  - that is caused by a build up of greenhouse gasses in the atmosphere.
  - that removes pollutants from the environment by living things.
21. A group of boaters noticed a greater number of insects in a fast moving mountain stream when compared with the lake that it fed into. How can this be explained?
- Fast moving water allows the sunlight to penetrate.
  - Fast moving water adds dissolved oxygen to the water.
  - Fast moving water provides the nutrients for the insects.
  - Fast moving water carries away the polluted chemicals in the water.
22. Spring acid shock occurs when snow melts in the spring releasing and the acid melt water flows into aquatic ecosystems. The acidity of the snow is a result of...
- a build up of pesticides in the snow over the winter.
  - nitrogen fixation that occurs during the winter months.
  - a build up of phosphorus and nitrogen in the soil over the winter.
  - industrial emissions that lead to acidic precipitation in the winter.

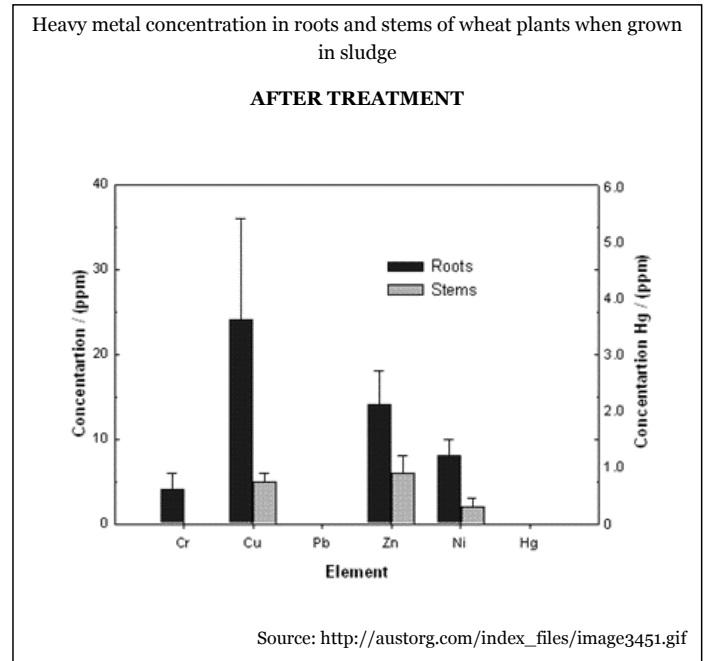
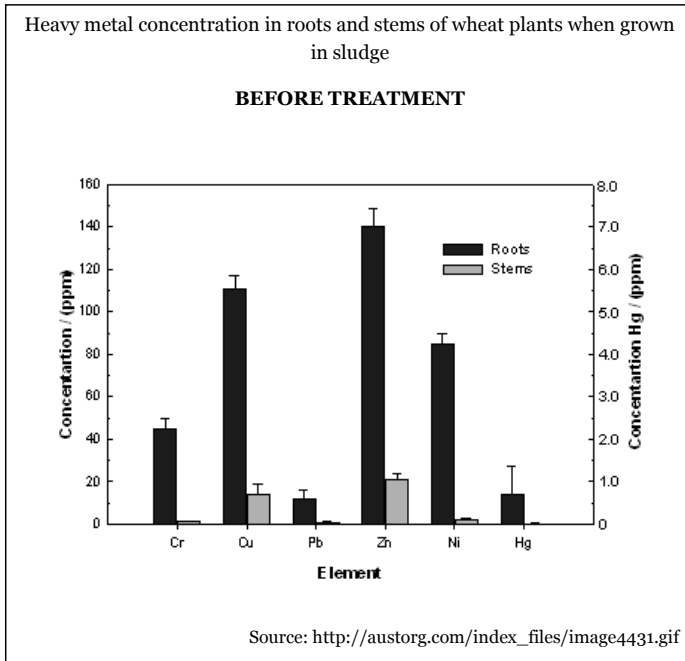
**Use the following information to answer the next 2 questions.**

The temperature and dissolved oxygen content of a nearby lake was recorded at various depths. Jeff was given the task of analyzing the data collected.

Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/L)
0	22	3.5
0.5	20	3.9
1.0	18	4.3
1.5	15	4.7
2.0	12	5.2
2.5	8	5.5
3.0	6	5.9
3.5	4	6.2
4.0	3	6.5

23. After studying the data table, Jeff concluded that water at a depth of \_\_\_\_ metres has a temperature of 10°C.
- 1.75
  - 2.25
  - 2.75
  - 4.50
24. What conclusion could Jeff make about the relationship between dissolved oxygen and temperature?
- There is no relationship, it is completely random.
  - As temperature decreases the concentration of dissolved oxygen increases.
  - As temperature decreases the concentration of dissolved oxygen decreases.
  - As the depth of the water increases the concentration of dissolved oxygen decreases.
- 
25. Which of the following would increase the movement of ground water and pollutants through soil?
- Tightly packed soil grains.
  - Soils that are impermeable.
  - Soil with high clay content.
  - Soil with many connected pores.

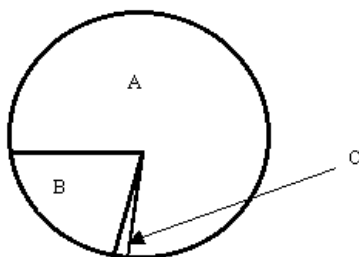
Use the following information to answer the next 2 questions.



26. Which heavy metal was in the highest concentration before treatment of the sludge?
- Zinc
  - Nickel
  - Copper
  - Mercury
27. What was the effect of treatments on the levels of heavy metals in the plants?
- The treatment was more effective in reducing levels in the roots than in the stems.
  - The treatment was more effective in reducing levels in the stems than in the roots.
  - The treatment was only effective in reducing levels of mercury and lead.
  - The treatment was not effective in reducing heavy metal concentrations.

**Use the graph below to answer the next question**

"Approximate distribution of essential gases that make up the composition of air"



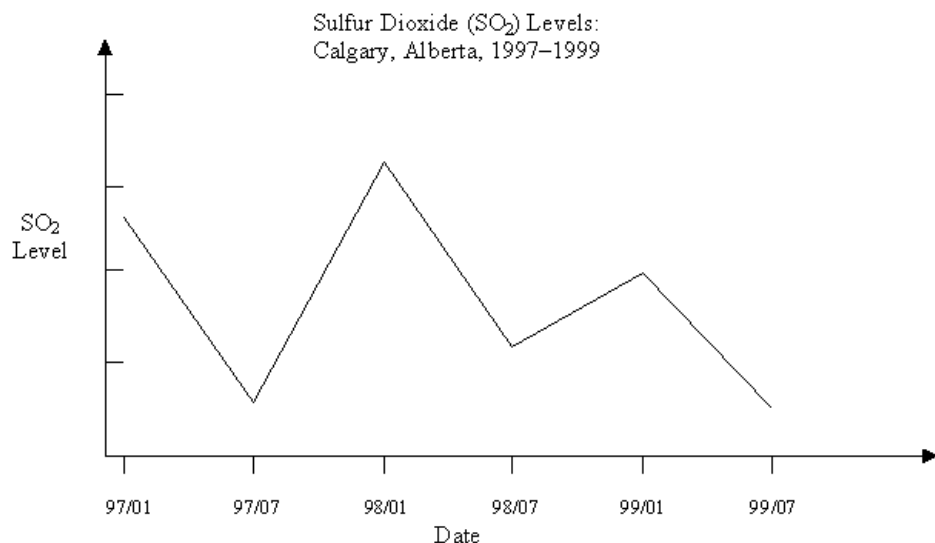
28. Which essential gas found in air is represented by sector A?
- oxygen
  - nitrogen
  - hydrogen
  - carbon dioxide
- 
29. There are several different methods that can be used to determine air quality. Which of the following methods would provide the most useful information regarding air quality?
- Estimating the amount of emissions from pollution sources.
  - Determining the percent of oxygen present in the air.
  - Measuring the levels of pollutants in the air.
  - Identifying all pollutants present in the air.
30. Three of the major air pollutants found in large urban areas include nitrogen oxides, carbon monoxide, and ground-level ozone. The main cause of these pollutants in large urban areas is
- the large population of people breathing the air.
  - the burning of oils and gases in industrial processes.
  - the production of large volumes of household waste.
  - the combustion of fuel in gasoline-powered vehicles.



**Use the following information to answer the next 2 questions**

Sulfur dioxide is a gas produced by industrial processes involved in the oil and gas industry.

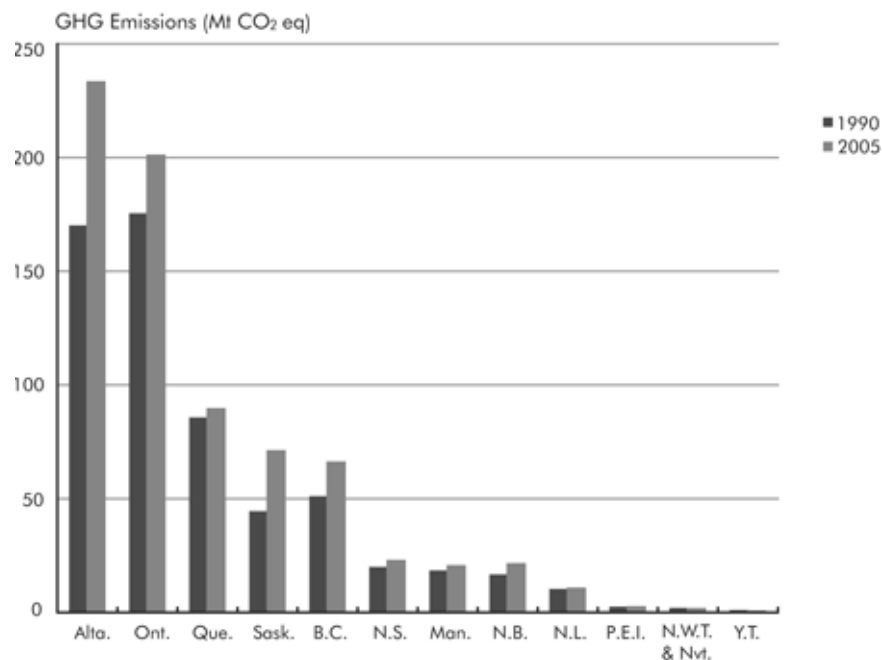
**"Sulfur dioxide levels measured in Calgary, Alberta, between 1997 and 1999."**



31. The results shown on this graph suggest that
- sulfur dioxide levels have risen from 1997 to 1999.
  - sulfur dioxide levels have remained constant over the years shown.
  - sulfur dioxide levels have continually decreased from 1997 to 1999.
  - sulfur dioxide levels are higher in mid-winter compared to mid-summer levels.
32. Why are sulfur dioxide emissions a concern?
- Sulfur dioxide breaks down the ozone layer.
  - Sulfur dioxide leads to the production of acid rain and smog.
  - Sulfur dioxide can leak into the soil and contaminate ground water supplies.
  - Sulfur dioxide can accumulate in the tissues of organisms affecting top consumers.
- 
33. What is the purpose of the ozone layer?
- To absorb much of the sun's harmful ultraviolet radiation.
  - To act as a shield, reflecting space and meteor shower debris.
  - To trap solar energy so that it can be used as an alternative energy source.
  - To heat up the Earth by trapping thermal energy generated from human activities.

**Use the following information to answer the next 3 questions**

**Greenhouse gas emissions by province/territory, 1990 and 2005**

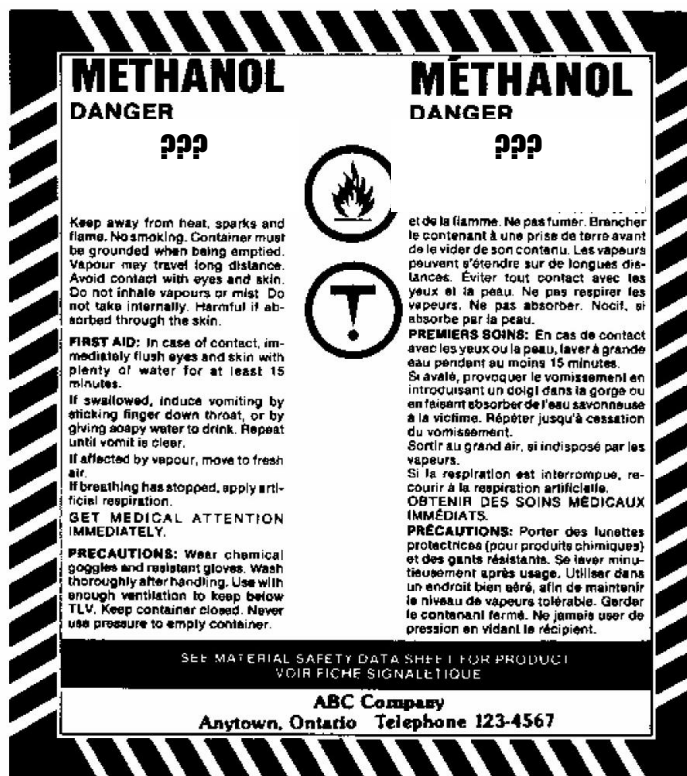


**Source:** Environment Canada, 2007a. *National Inventory Report: Greenhouse Gas Sources and Sinks in Canada, 1990–2005*. Greenhouse Gas Division, Ottawa, Ontario.

34. The greenhouse gas emissions are a concern because they contribute to
- the enhanced greenhouse effect.
  - depletion of the ozone layer.
  - carbon dioxide saturation.
  - greenhouse depletion.
35. Why would Alberta's greenhouse gas emissions be so high?
- Oil and gas industries are numerous in Alberta.
  - Alberta is significantly colder than any other province.
  - Winds move all of the pollutants from British Columbia to Alberta.
  - Alberta's population is so much larger than any of the other provinces and therefore we emit more greenhouse gasses.
36. Statistics show that Canada has only 0.5% of the world's population, yet we are responsible for about 2% of carbon dioxide emissions in the world. Other developed countries likely have similar statistics. The problem is that these emissions do not only affect Canada, but they affect all other countries on Earth. Because of these effects, harmful gas emissions must be dealt with at
- a national level.
  - a provincial level.
  - a municipal level.
  - an international level.

37. Which of the following activities would increase the amount of pollution in an environment?
- dilution
  - deposition
  - dispersion
  - bioremediation
38. Why should bleach be taken to a hazardous waste collection site and not be poured down the drain?
- Because bleach could burn your hands.
  - Because bleach could contaminate surface water supplies once it is in the sewer system.
  - Because the bleach could seep into the soil surrounding your home and damage your lawn.
  - Because bleach could contaminate the ground water supplies once it is in the sewer system.

**Use the following information to answer the next 2 questions**



39. Methanol is both...
- flammable and toxic causing immediate effects.
  - oxidizing and toxic causing immediate effects.
  - flammable and toxic causing other effects.
  - oxidizing and toxic causing other effects.
40. The diagram above is an example of a
- WHMIS label.
  - Chemical Ingredient Label.
  - Household Hazardous Symbol.
  - Material Safety Data Sheet (MSDS).

**Answers:**

1. A
2. A
3. D
4. D
5. C
6. C
7. B
8. C
9. B
10. A
11. A
12. B
13. A
14. C
15. D
16. C
17. D
18. B
19. D
20. A

21. B
22. D
23. B
24. B
25. D
26. A
27. A
28. B
29. C
30. D
31. D
32. B
33. A
34. A
35. A
36. D
37. B
38. B
39. D
40. A