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Period: _____

AP Environmental Science

Mining and its Environmental Impact- Lab and Analysis

Lab Procedure, Observations, & Descriptions

→ *Safety Goggles are required for the entire lab procedure. Sulfuric acid will burn holes in your clothes.*

- 1) Observe and describe the piece of azurite (copper ore).

- 2) Wrap the piece of azurite (copper ore) in several paper towels and place it on the cloth kitchen towel. Carefully pulverize the rock with the hammer into pea-sized or smaller pieces (goggles).
Observe and describe the crushed/pulverized azurite (copper ore).

- 3) Using the electronic balance, weigh out 1 gram (g) of the pulverized azurite and carefully transfer it into a clean test tube.
- 4) **Observe and describe the sulfuric acid in the dropper bottle.**

- 5) Using the graduated cylinder, measure and 10 mL of 2 M sulfuric acid solution and add it to the test tube with the pulverized azurite (goggles). Allow the sulfuric acid solution to react with the azurite for 20 minutes, stirring occasionally with a stirring rod.
- 6) ***Observe and describe the reaction between the sulfuric acid and the pulverized azurite.***

Refer to the background information to answer the questions 7-9.

- 7) What increases the solubility of metals?

- 8) Write a chemical equation that describes the reaction between the sulfuric acid and the pulverized azurite.

- 9) Describe what is happening in the reaction in terms of chemistry between the sulfuric acid and the pulverized azurite.

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- 10) **After 20 minutes *observe and describe* the solution in the test tube.**
- 11) Using the sandpaper, sand the surface of the nail. Carefully place the nail point side down into a clean test tube. ***Observe and describe the nail.***
- 12) Place a funnel into the top of the clean test tube with the nail. Fold the filter paper in half and then in half again (as your instructor demonstrated).
— Place the folded piece of filter paper into the funnel (as your instructor demonstrated).
— Carefully pour the sulfuric acid-azurite mixture into the filter paper in the funnel (goggles).
- 13) **Closely observe the copper sulfate solution as it drips through the filter paper and onto the sanded nail. Observe and describe what happens to the solution and the surface of the nail.**

Refer to the background information to answer the questions 14 & 15.

- 14) Write a chemical equation that describes the reaction between the solution and the surface of the nail.
- 15) Describe what is happening in the reaction in terms of chemistry.

16) Discard all substances in the designated waste container as demonstrated by your instructor (goggles).

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Background Information and Analysis Questions

Refer to the background information handout to answer the questions below.

- 17) Explain how cyanide is used to mine gold.

- 18) Write a chemical equation that shows how cyanide is used to leach gold from ore and how gold is recovered from the “pregnant solution.”

- 19) Describe what happens in the reactions in terms of chemistry.

- 20) Why does gold mining create so much waste? Include important terminology and provide specific examples. What environmental problems does this present?

- 21) What is acid mine drainage? What are two ways that it negatively impact stream and river ecosystems?

- 22) What is the “main ingredient” of acid mine drainage and where does it come from?

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23) Write a chemical equation that shows how acid mine drainage forms.

24) Describe what happens in the reaction in terms of chemistry.

25) How does acid mine drainage cause heavy metal leaching and why is this a problem?

26) What is “yellow boy”? Describe the process that forms “yellow boy”. Why is this a problem?

27) What happened at Iron Mountain Mine? Describe the environmental problems at Iron Mountain Mine.

28) Explain two remedies for acid mine drainage.

29) What is effluent?

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30) What are settling ponds? Explain how they are used to treat mine effluent.

31) What are tailings? How are they stored?

32) Explain some environmental consequences that have arisen due to tailings containment and discharge.

33) What is dewatering and drawdown. What environmental problems do they present?

34) What is a pit-lake? What environmental problems do they present?

35) Identify and describe a form of air pollution brought on by gold mining.

36) Describe the mercury amalgamation method. What environmental problems does it present?

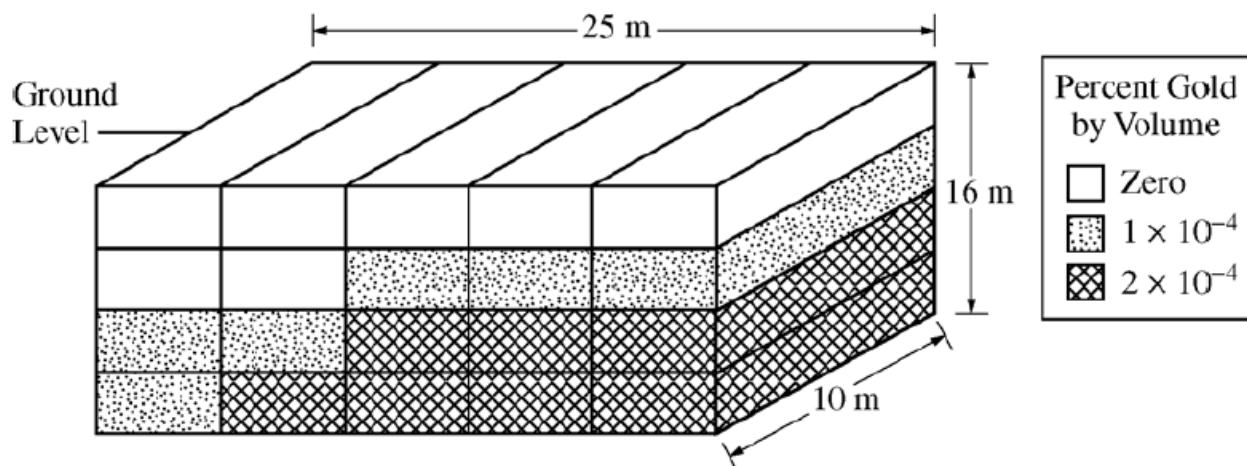
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Problem Set → Show All Work Do Not Use A Calculator



- 37) Auric Miners, Inc., won a contract to mine gold from the terrain represented in the diagram above. The terrain can be divided into 20 rectangular blocks, each with a volume of 200 cubic meters. Site analysis has revealed the average gold content of each block, as designated by the different patterns shown in the legend.
- (a) Calculate the volume of gold, in cubic meters, that can be mined from the excavation of all 20 blocks. Show all work.
- (b) Calculate the percent of gold in the total excavation. Show all work.