Phytomining: storyboard

Learning objectives

1. Sequence the processes involved in phytomining using a story board.
2. Use keys words to describe the processes involved in phytomining.
3. Recall advantages and disadvantages of phytomining.

Introduction

In today’s technological society, there is an increasing need for valuable metals to use in computers and mobile phones. When the concentration of metal ore is too low for conventional mining, then phytomining, using plants, can be used to extract the metals. This storyboard worksheet will enable you to identify the different stages in the process of phytomining, and describe what is happening using key words.

Instructions

Create a storyboard to describe the processes involved in phytomining. A storyboard contains an illustration and a short section of text underneath to describe what is happening in the picture. The storyboard shows a sequence of events.

**Key words**

absorb  advantage  ash

burnt  concentrated  disadvantage

displacement  economic  electrolysis

impure  roots  slow

toxic  hyperaccumulators

What does a storyboard look like?

Use the table to show how the stages progress in the following order:

|  |  |  |  |
| --- | --- | --- | --- |
| **1** | **2** | **3** | **4** |
|  |  |  |  |
| **5** | **6** | **7** | **8** |
|  |  |  |  |

Complete the storyboard. Use the keywords from the instruction sheet if you need additional support.

|  |  |  |  |
| --- | --- | --- | --- |
| An illustration of a young green plant on a pale blue background. The plant has a single leaf and the stem is curved over with the leaf hanging down towards the ground. A few short roots are shown in the brown soil. The soil contains five yellow spheres which are spread evenly. | An illustration of a green plant on a pale blue background. The plant has three leaves and the stem is upright. The roots are shown in the brown soil. Five yellow spheres are drawn over the roots. | An illustration of a green plant on a pale blue background. The plant has grey roots in brown soil. The plant has 7 green leaves. Distributed throughout the leaves are 8 small yellow spheres which represent the minerals that hyperaccumulator plants take up from the soil. | An illustration of a green plant with nine leaves and grey roots surrounded by red and orange flames. The leaves of the green plant are overlaid with small yellow spheres to represent the metal. |
| Plants called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are grown in contaminated soil, where small amounts of minerals (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) are found. | Plants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the minerals (low grade ore) via their \_\_\_\_\_\_\_\_\_\_\_\_. The minerals are not \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the plant. | The plants use the minerals to grow. Excess minerals are stored and **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in their leaves. | When the plants are big enough, they are \_\_\_\_\_\_\_\_\_\_\_\_\_ in air to form \_\_\_\_\_\_\_\_\_\_. |
| An illustration of a pile of grey ash containing small yellow spheres. | An illustration of a beaker set up for electrolysis. There is a symbol for a cell connected to two black rectangles representing the electrodes. The beaker contains a substance made up of two different coloured spheres. The yellow spheres are more concentrated around the negative electrode. The grey spheres are more concentrated around the positive electrode.An illustration of a hand holding a black bag with a white pound currency symbol on it. Gold coins are falling into the bag. |  | A illustration of a hand holding a calendar. The top page has a single number 1. The calendar is spiral bound along the top edge. Pages are falling out of the bottom of the calendar with the numbers 2, 10, 21, 20, 16, 31. |
| The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** metal compound is found in the \_\_\_\_\_\_\_\_\_\_. | Chemical processes such as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are used to then purify the metal from the ash. | One **\_\_\_\_\_\_\_\_\_\_\_\_** of phytomining compared to traditional mining is itcan extract valuable metals from low grade ores when it is not usually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to do so. | One **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of phytomining compared to traditional mining is it is a \_\_\_\_\_\_\_\_\_\_\_\_ process as you need to wait for the plants to grow. |

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|  |  |  |  |
| --- | --- | --- | --- |
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|  |  | An illustration of a hand holding a black bag with a white pound currency symbol on it. Gold coins are falling into the bag. | A illustration of a hand holding a calendar. The top page has a single number 1. The calendar is spiral bound along the top edge. Pages are falling out of the bottom of the calendar with the numbers 2, 10, 21, 20, 16, 31. |
| An illustration of a pile of grey ash containing small yellow spheres. | An illustration of a beaker set up for electrolysis. There is a symbol for a cell connected to two black rectangles representing the electrodes. The beaker contains a substance made up of two different coloured spheres. The yellow spheres are more concentrated around the negative electrode. The grey spheres are more concentrated around the positive electrode. |  |  |
|  |  |  |  |

Complete the storyboard. Try to use all the keywords. You must include one advantage and one disadvantage of phytomining.

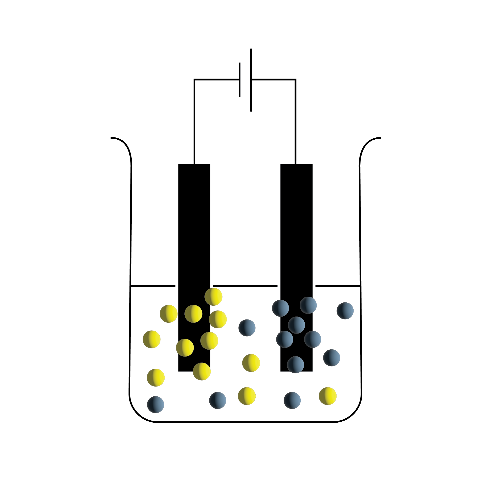
|  |  |  |  |
| --- | --- | --- | --- |
| An illustration of a young green plant on a pale blue background. The plant has a single leaf and the stem is curved over with the leaf hanging down towards the ground. A few short roots are shown in the brown soil. The soil contains five yellow spheres which are spread evenly. |  |  |  |
| Plants called **hyperaccumulators** are grown in contaminated soil, where small amounts of minerals (**low grade ores**) are found. |  |  |  |
|  |  |  |  |
|  |  |  |  |

Complete the storyboard. Try to use all the keywords. You must include one advantage and one disadvantage of phytomining.

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Support

Use these images to complete the storyboard. You will need to put them into the correct order in the sequence.

An illustration of a green plant on a pale blue background. The plant has three leaves and the stem is upright. The roots are shown in the brown soil. Five yellow spheres are drawn over the roots. 
An illustration of a green plant on a pale blue background. The plant has grey roots in brown soil. The plant has 7 green leaves. Distributed throughout the leaves are 8 small yellow spheres which represent the minerals that hyperaccumulator plants take up from the soil.