

Teacher modelled question

Copy the modelled answer down.

Read the information about the production of uranium.

Uranium oxide is used in nuclear reactors. Around 75,000 tonnes of uranium oxide is needed every year. Traditional mining methods such as underground mines and open cast mines supply around 20,000 tonnes of uranium oxide per year.

In traditional mining techniques, the uranium ores are crushed and pulverised into very fine fragments. Water is added to make a slurry. This is mixed with sulfuric acid. A precipitate of uranium oxide forms. This is not very pure and needs to be enriched. This process involves a lot of energy. Large amounts of waste rock slurry are produced.

The remaining 55,000 tonnes of uranium is extracted from low-grade ores or previously used ore by bioleaching. In bioleaching bacteria oxidise Fe^{2+} and S^{2-} ions. This leads to the formation of sulfuric acid which can then break down the uranium ore into soluble uranium ions.

Explain why more uranium is produced by bioleaching than traditional mining techniques. (6 marks)

Student question

Use the same techniques to answer this question.

Read the information about production of copper.

- World demand for copper in 2014 was about 22 million tonnes.
- World reserves of copper are about 700 million tonnes.
- Most of the copper today is obtained from copper ores. The ores are mined.
- Copper ore is heated in a furnace to produce copper sulfide. The furnace is heated by burning fossil fuels. Air is blown through the hot copper sulfide to produce copper and sulfur dioxide.
- Some copper is extracted from low-grade ores by phytomining. Phytomining uses plants to absorb copper compounds. The plants are burned and copper is extracted from the ashes.

A scientist stated:

'More copper should be extracted by phytomining.'

Use the information to justify the scientist's statement.

[6 marks]