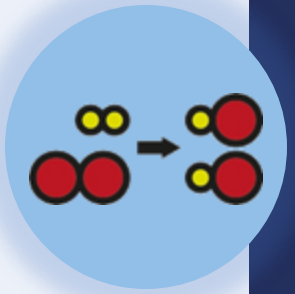
Recycling Metals

Answer the questions below.

1. State a use of copper metal.
   Copper metal is used for electrical wiring.
2. State one disadvantage of traditional mining of metal ores.
   Traditional mining of metal ores destroys habitats.
3. Name one metal that does not need to be extracted from an ore.
   Gold, silver
4. Glass is made from limited raw materials. Name one thing that people can do to reduce the amount of raw materials we use for glass products.
   People can reduce their use of glass, reuse glass products or recycle glass.
5. (HT) Define bioleaching.
   Bioleaching is a method to extract metals from their ore using living organisms such as bacteria.



Do Now

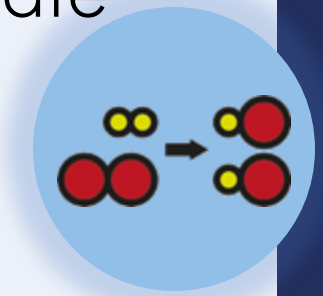
Recycling Metals

Do Now:

1. State a use of copper metal.
2. State one disadvantage of traditional mining of metal ores.
3. Name one metal that does not need to be extracted from an ore
4. Glass is made from limited raw materials. Name one thing that people can do to reduce the amount of raw materials we use for glass products
5. (HT) Define bioleaching.

Drill:

1. Copper oxide is an ore of copper with the formula CuO. Calculate the relative formula mass of copper oxide.
2. Calculate the percentage composition of oxygen in CuO.



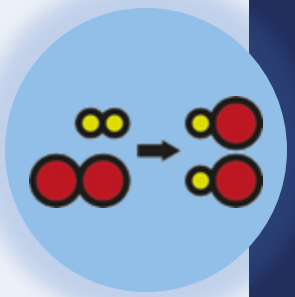
Do Now

Recycling Metals

Read Now:

A new battery **recycling** service in Portsmouth has been a massive success. 750 kg of batteries were collected by the City Council's battery recycling service in just the first 2 months of the service running. The types of batteries that can be recycled include regular household batteries, laptop batteries, and batteries from hearing aids. After collection, the batteries are sorted so that as much material as possible can be recovered to make new products. Batteries contain toxic metals such as mercury and lead which can do great harm to the environment and the health of organisms. By recycling, these materials can be used in new products, and they don't end up in landfill.

1. What does this new service in Portsmouth do?
2. What mass of batteries was collected in the first 2 months?
3. What kinds of batteries are collected by this new service?
4. Why is it important to recycle old batteries?
5. Define the word in **bold**.



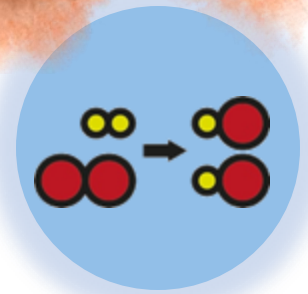
Do Now

22/11/2024

Recycling Metals

C4.2.15

Science Mastery

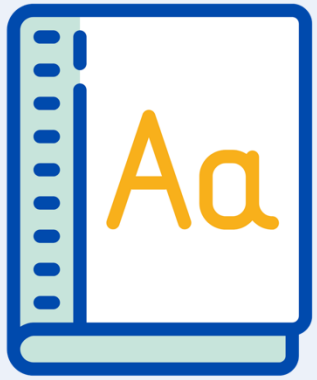


C4.2.1 PKR: Reactions of Metals
C4.2.2 Extracting Less Reactive Metals
C4.2.3 PKR: Ions, Ionic Bonding and Deducing Ionic Formulae
C4.2.4 (HT) Ionic Equations and Displacement Reactions
C4.2.5 (HT) Writing Half Equations
C4.2.6 (HT) Ionic Equations for the Reactions of Acids and Metals
C4.2.7 Introduction to Electrolysis
C4.2.8 Extracting Metals by Electrolysis
C4.2.9 Electrolysis of Molten Ionic Compounds
C4.2.10 Electrolysis in Solutions
C4.2.11 RP: Electrolysis of Aqueous Solutions 1
C4.1.12 RP: Electrolysis of Aqueous Solutions 2
C4.1.13 TIF: Corrosion and its Prevention
C4.2.14 (HT) Obtaining Raw Materials
➢ **C4.2.15 Recycling Metals**
C4.2.16 Feedback Lesson

Following this lesson, students will be able to:

- Describe how metals are recycled
- Describe the ethical, social, economic and environmental impacts of recycling metals
- Suggest how the public and businesses might be encouraged to recycle their waste metals

Key Words:



recycle **ethical**

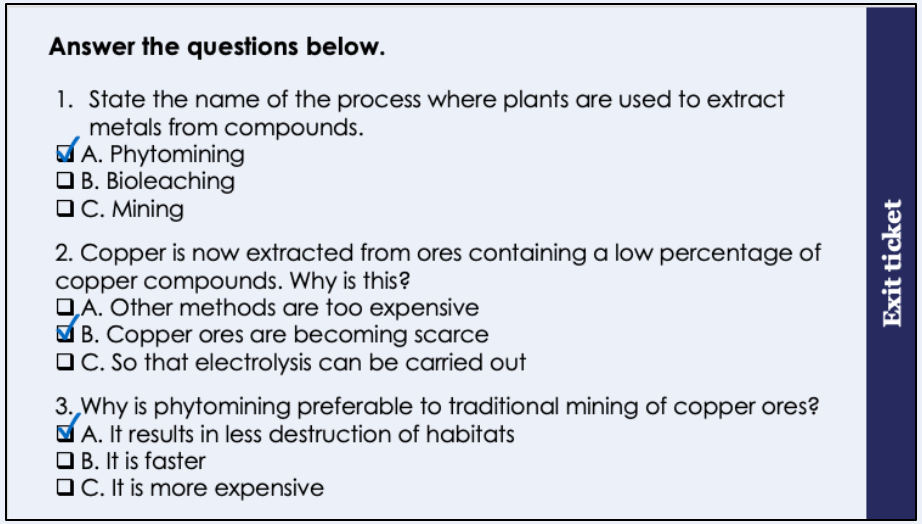
social **economic**

Lesson Objectives

This is the fix-it portion of the lesson

The **fix-it** is an opportunity to respond to gaps in knowledge, especially those identified by the previous lesson's exit ticket.

- The teacher should customise this slide as needed, to facilitate
  - **reteach**, **explanation, demonstration** or **modelling** of ideas and concepts that students have not yet grasped or have misunderstood.
  - **practise** answering specific questions or of key skills.
  - **redrafting** or **improving** previous work.



Fix-it

Recycling Metals

Recycling metals involves collecting used metal items and turning them into new metal items

To do this:

1. **Scrap metal is collected** and transported to a sorting centre
2. Items are broken up, and **sorted** into different kinds of metals
3. Other materials such as plastic are removed
4. The metals are **melted down**
5. The metals are **recast** into new items

The effects of recycling metals

Advantage

Disadvantage

Category	Effect
Social *(an effect to do with people)*	• People have to make the effort to sort and recycle their metal waste. • The recycling of metals provides jobs for people.
Environmental *(an effect to do with the environment)*	• Less damage to the environment as no quarries or mines are required. • Less noise pollution from heavy traffic. • Valuable raw materials are preserved.
Economic *(an effect to do with money)*	• Sorting and recycling metals costs a lot of money • It costs less to recycle metals than it does to extract new metals from ores.

Recycling Metals

Many metals can be recycled.

Describe the advantages and disadvantages of recycling metals.

Social disadvantage:

- **People have to make the effort to sort and recycle their metal waste.**

Social advantage:

- **The recycling of metals provides jobs for people.**

Environmental advantages:

- **Less damage to the environment as no quarries or mines are required.**
- **Less noise pollution from heavy traffic from quarries**
- **Valuable raw materials are preserved.**

Economic disadvantage:

- **Sorting and recycling metals costs a lot of money**

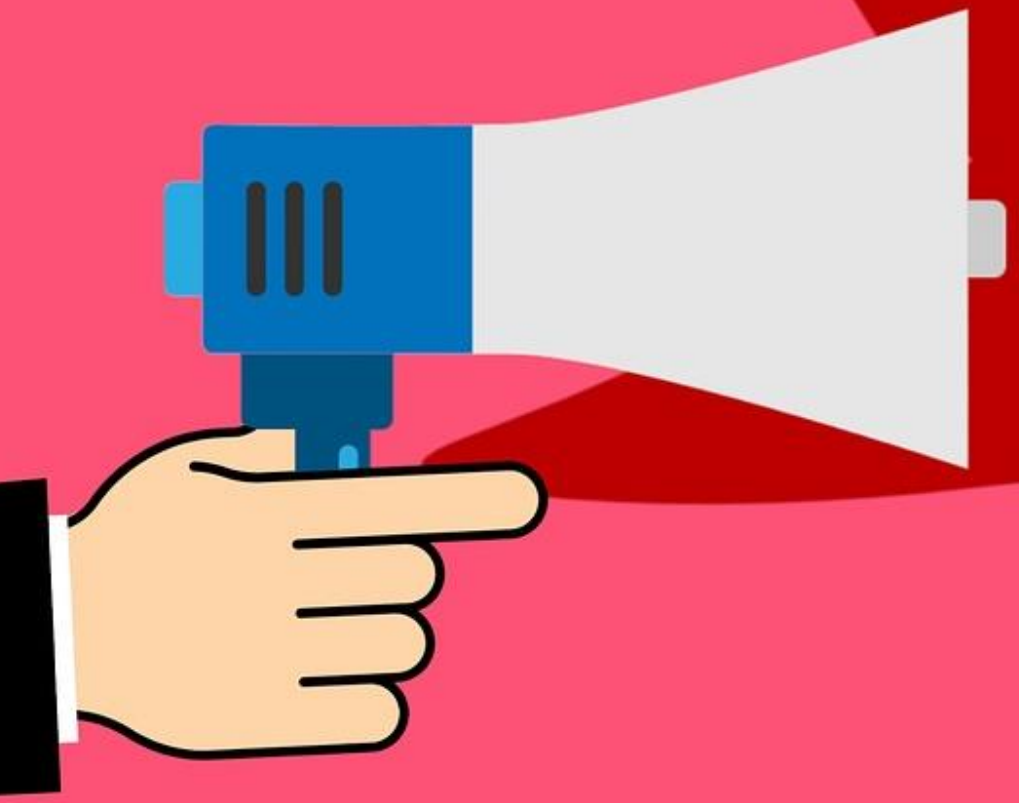
Economic advantage:

- **It costs less to recycle metals than it does to extract new metals from ores.**

Talk Task

Imagine you work for the local council

Discuss: What could you do to convince more people and businesses to recycle metals?



Talk Task

Drill

1. What does recycling metals involve?
2. What does it mean to recast a molten metal?
3. Describe a social advantage of recycling metals.
4. Describe a social disadvantage of recycling metals.
5. Describe an environmental advantage of recycling metals.
6. Describe an economic advantage of recycling metals.
7. Describe an economic disadvantage of recycling metals.

Check for understanding

Drill answers

1. Recycling metals involves collecting used metal items and turning them into new metal items
2. Recasting a metal means shaping a molten metal to make a new product
3. A social advantage of recycling metals is that it provides jobs
4. A social disadvantage of recycling metals is that people have to make the effort to sort and recycle their metal waste.
5. An environmental advantage of recycling metals is that valuable raw materials are preserved.
6. An economic advantage of recycling metals is that it costs less than extracting metals from ores
7. An economic disadvantage of recycling metals is that it costs a lot of money.

Check for understanding

I: Explain: *to use scientific understanding to make something clear or state the reason for something happening*

Example question:

Copper ores are becoming harder and harder to find. One solution to meet the demand for copper is to recycle copper items.

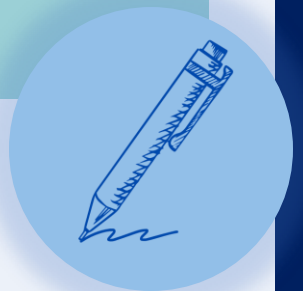
Explain why copper should be recycled.

Model answer:

- Copper should be recycled to preserve valuable **natural resources** (ores)
- and because recycling is **less expensive** than extracting metal from its ore

To 'explain' your answer should:

- Begin with a **scientific statement**.
- Use 'this means that', 'because' or 'so' **to link your statement to the question**.



Writing like a scientist

We: Explain: *to use scientific understanding to make something clear or state the reason for something happening*

Example question:

Aluminium metal is used to make drinks cans. It is obtained from ores within the Earth's crust by electrolysis. Aluminium cans can be recycled.

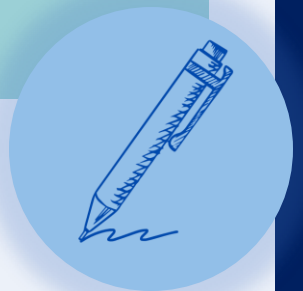
Explain why aluminium should be recycled.

Model answer:

- Aluminium cans should be recycled to preserve valuable **natural resources** (ores)
- and because recycling these cans is **less expensive** than extracting metal from its ore

To 'explain' your answer should:

- Begin with a **scientific statement**.
- Use 'this means that', 'because' or 'so' **to link your statement to the question**.



Writing like a scientist

You: Explain: *to use scientific understanding to make something clear or state the reason for something happening*

Example question:

Many metals can be recycled but are not always.

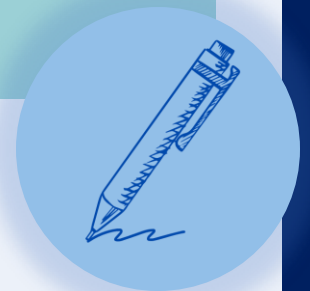
Explain why people may not always recycle metals.

Model answer:

- people might not be aware of the **advantages** of recycling
- people might not be provided with **facilities**, bins or areas to recycle their old copper items
- people might not know that items are recyclable

To 'explain' your answer should:

- Begin with a **scientific statement**.
- Use 'this means that', 'because' or 'so' **to link your statement to the question**.



Writing like a scientist

Answer the questions below.

1. Choose which describes a method used to recycle metals.

- ❑ A. Reforming then melting
- ❑ B. Recasting then reformed
- ☑ C. Melting then recasting

2. Steel cans should not be disposed of in landfill because…

- ☑ A. the metal can be recycled instead
- ❑ B. the iron can form iron ore
- ❑ C. the landfill costs more than recycling

3. Which of the following is a **social** advantage of recycling metals?

- ❑ A. Recycling metals is less costly than extracting metals from ores
- ☑ B. Recycling metals provides jobs for people
- ❑ C. Recycling metals preserves valuable natural ores.

Exit ticket

Feedback

Lesson C4.2.15	
What was good about this lesson?	What can we do to improve this lesson?

Send us your feedback by clicking this link
or by emailing sciencemastery@arkonline.org
Thank you!