

THE E-WASTE GOLD MINE

This lesson introduces students to the value of metals found in e-waste and various methods to recover them.

LESSON OBJECTIVES

Students will be able to:

- Understand what metals are found in e-waste and their value
- Understand how e-waste is recycled
- Consider various techniques to extract metals from e-waste

SUMMARY OF TASKS

PART 1 – INTRODUCTION

- Intro question for the class: What valuable materials might be found in e-waste?
- Give a brief introduction from the 'The E-waste Gold Mine' fact sheet
- Ask students questions from the front, write answers on the board:
 - What electronic devices do you find essential in your life?
 - What might happen to those devices if you put them in the normal bin?
 - What might happen to them if you recycle them?
- Watch '*How e-waste is recycled*' video¹ (6 mins) from an American company and ask students if they have any comments

PART 2 – RESEARCH ACTIVITY

- Split the class into groups. Each group will be given a metal recovery method to research and then present their findings to the rest of the class
- The metal recovery categories are: Electrostatic/magnetic, Pyrometallurgical, Hydrometallurgical, Bioleaching
- During the research stage you may wish to go around the class and aid weaker learners by suggesting helpful search terms for them to try

PART 3 – PRESENTATIONS

- Ask student groups to present their findings one at a time to the rest of the class. Other students are encouraged to ask questions

RESOURCES/ EQUIPMENT

- 'The E-waste Gold Mine' fact sheet
- At least one device per group for students to perform research

HOMEWORK/ EXTRA ACTIVITIES

- Ask students to report on what they think is the best method for metal recovery from e-waste and why

¹ <https://www.youtube.com/watch?v=w0ikFMTuS9c>

FACT SHEET: THE E-WASTE GOLD MINE

FACT SHEETS HAVE BEEN DESIGNED FOR TEACHER USE TO AID CREATING OF TEACHING RESOURCES, OR THEY ARE FREE TO BE REPURPOSED FOR STUDENT USE.

E-waste is a collective term for discarded electrical and electronic equipment. The accumulation of this waste poses hazards to the environment but could also be a source of valuable materials for future products. In this sense, perhaps it should not be categorised as 'waste', but instead as a secondary resource. Although many disposed electronics could first be considered for re-use or refurbishment, eventually we need to look to material recycling when the product has reached the end of its life.

The global e-waste management market is expected reach approx. £39 billion in 2020. E-waste contains many valuable and recoverable materials such as aluminium, iron, copper, silver and gold. Recovering these materials would not only make a lot of money, but also help to conserve natural resources. For example, 1 ton of printed circuit boards contains about £4,900 worth of gold, £3,100 worth of other precious metals and £1,200 worth of copper.

SOURCES AND ADDITIONAL RESOURCES

- <http://www.virogreen.co.uk/e-waste-recycling-uk/>
- <https://www.thebalancesmb.com/introduction-to-electronics-e-waste-recycling-4049386>
- <https://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/news-parliament-2017/-electronic-waste-and-the-circular-economy-inquiry-launch-17-19/>
- <https://www.intechopen.com/books/e-waste-in-transition-from-pollution-to-resource/a-review-of-technology-of-metal-recovery-from-electronic-waste>