
WORKSHOP 7

What makes an Ore Deposit worth Mining?

The activity in brief		Mixtures of minerals are separated using simple techniques based on density differences and which model the buddles and jigs once used at Ecton. Students discuss the impact of technological change, the demand for copper and world copper markets to decide whether or not a deposit is worth mining. Will Parys mountain in Anglesey reopen?
Suitable for	WJEC	AS/A2 (Rationale p 7) – exploitation of... mineral resources ... in a sustainable way
	OCR	A2 F794, Module 3 - unsustainable resource exploitation (p 36)
Suitable for teaching/assessing investigative skills		Implementing (for mini-practical with jig & buddle.
Topic addressed		Mineral processing; factors affecting the viability of an ore deposit
Student practical or teacher demonstration?		a) Brief practical to be carried out at Ecton b) Mainly follow-up work for use back at home
Time needed to complete activity		a) Practical work plus introduction; 20 minutes b) Homework - open ended.
Resource list		Jigging: bucket of water; 30 cm Perspex tube with gauze at bottom; mixture of minerals crushed to about 3-4 mm diameter (galena, barite, fluorite, calcite) Buddling: buddle (guttering with baffles glued across at intervals); buckets; mineral mixture as above, crushed to about 2mm diameter. Download and print at school for follow-up work as needed: <ul style="list-style-type: none"> GW7 SS1: What makes an Ore Deposit worth Mining (NB 7 pages)

Ideas for following up the activity Point out that jigging and buddling formed the basis of the ore separation at Ecton, but that the methods are too crude to be used widely today. Instead froth flotation is used, enabling lean ores such as 0.4% copper content to be processed economically.

Discuss what other factors students think might influence the commercial viability of a mine. Hand out the information sheet, for follow up, once students have left Ecton, with possible questions from their own teacher.

Ideas for introducing/leading into the activity: See above

Description of activity in detail:

(These notes are for the Ecton Tutor but are retained here for those who wish to repeat the activity at School/college.)

Hand round samples of ore minerals, where more than one mineral is present in each sample, e.g. galena, calcite, barite. Also hand round reasonably pure samples of each mineral. Ask how students would separate the minerals from the mixed sample and lead discussion on the topic.

Split the group, so that one half carries out jigging and the other half does the buddling. Change over after a result has been achieved.

Jigging (Figure 7.1a):

Quarter-fill the Perspex tube with a charge of mixed crushed minerals and shake the tube up and down rapidly in a bucket nearly full of water, until the minerals separate out by relative density (RD), e.g. from the base upwards – galena (RD 7.4); barite (4.4); fluorite (3.2); calcite.

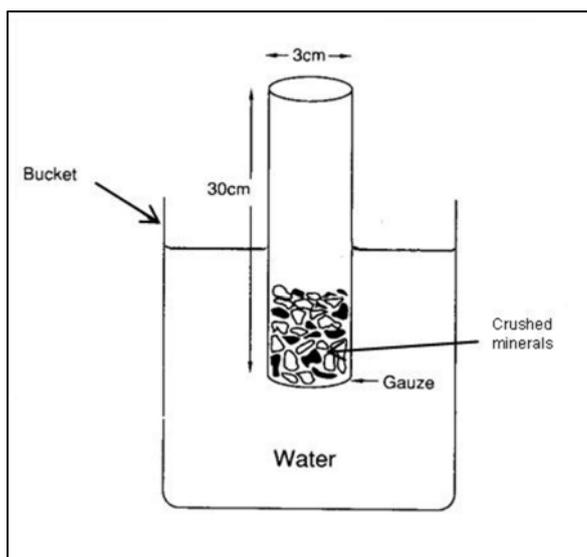


Fig 7.1a The principle of the jig

Buddling

Place the crushed mineral charge at the head of the buddle and gently wash water down until the minerals spread out along the base of the gutter, with the densest near the top and the least dense near the base or in the collecting bucket.

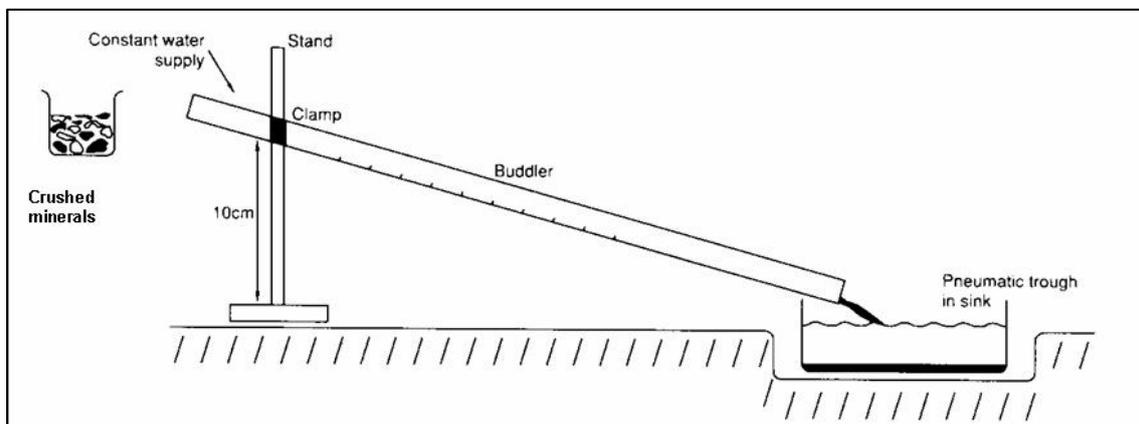


Fig 7.1b A gutter buddle in action