

How do sedimentary beds form? – and why can we see them? Demonstrating how the beds in sedimentary rocks are deposited

Sedimentary rock layers are called beds, if they are more than 1 cm thick*. Each bed was laid down by a single sedimentary event, so the beds in the photo below were laid down by many, many separate events of sand deposition. The junction between beds is called a bedding plane and is normally a flat horizontal surface.



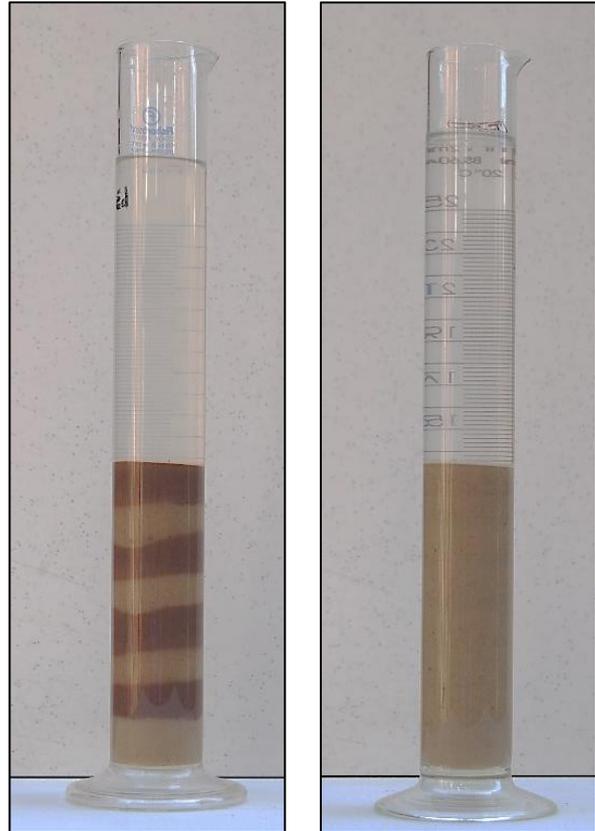
Bedding in 140 million year old sedimentary rocks, Morro Solar, Lima, Peru. This series of beds has been tilted by tectonic forces.

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You can make your own beds by filling a measuring cylinder $\frac{2}{3}$ full of water and adding spoonfuls of sand. Each spoonful you add is a single sedimentary episode and the junction between each layer is a bedding plane.

If you use sands of different colours, the beds can be seen easily, as in the first measuring cylinder photo. But beds are also formed if spoonfuls of sand of the same colour are added, as in the second photo – but you just cannot see them.

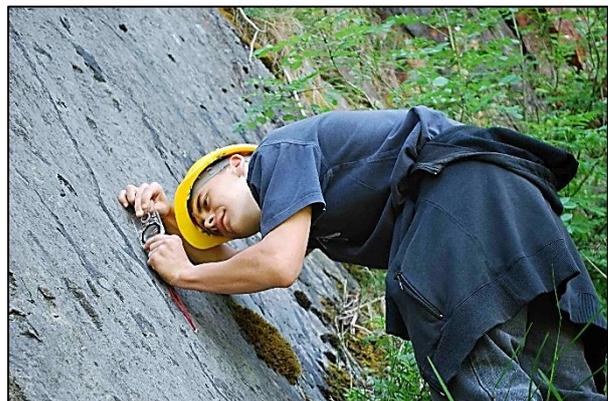
If it is impossible for the bedding planes in beds of one colour of sand to be seen, you may have wondered why we can usually see the bedding planes and the beds in many sedimentary rocks. The answer is that, although they have the same colour, as each layer is deposited it has small differences between the bottom and the top. For example, the sand at the bottom of each bed might be slightly coarser or slightly better packed (grains closer together), the sand at the top might be slightly finer or slightly more compacted.



Bedding in a measuring cylinder, with sands of different colour on the left and sands of one colour (but added in several sedimentary episodes or spoonfuls) on the right. (Chris King).

So, later when the sands have been compacted and cemented to form sandstones, the slight differences between the top of one bed and the bottom of another remain. These are later attacked by weathering and erosion so that the bedding plane and the beds can be seen.

Bedding planes are even clearer if there was an interval of time between the laying down of the upper and lower beds. In that time interval, the lower bed may have become more compacted, or partially eroded or sedimentary structures like ripple marks may have formed on the surface. So, when the sediment becomes rock which is later weathered and eroded, the beds and bedding planes can be seen clearly.



Measuring the angle of slope (strike and dip) of a dipping bedding plane. (Peter Kennett).

* Layers less than 1 cm thick are called laminations; sediments that form laminations are usually silts and muds.

The back up

Title: How do sedimentary beds form? – and why can we see them?

Subtitle: Demonstrating how the beds in sedimentary rocks are deposited

Topic: Using a measuring cylinder to demonstrate how beds form and to discuss why bedding planes can be seen clearly in many sedimentary rocks.

Age range of pupils: 10 years upwards

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:

- describe what a bed looks like;
- explain how a bed is formed by a single sedimentary episode.
- explain why, although beds are often formed in sediments of one colour, their bedding planes can be seen when the sedimentary rock containing the beds is exposed.

Context:

Bedding is a common feature of sedimentary rocks, but the ways in which bedding formed and the reasons why bedding is such a common feature of sedimentary rocks is not often considered. By demonstrating how bedding forms, in the classroom or field, classes can gain a much better understanding of this very widespread sedimentary process.



Several beds of sediment in a measuring cylinder, but the bedding planes cannot be seen because the sand is all the same colour. (Chris King).

Following up the activity:

Study how other sedimentary features form using the Earthlearningideas in the Rock Cycle section of the Earthlearningidea website at: https://www.earthlearningidea.com/home/Teaching_strategies.html#rockcycle.



Bedding demonstrated in a small plastic measuring cylinder in the field in front of bedded rocks, Triassic sandstone near Sully, South Wales. From the 'Fieldwork: interactive re-creation' Earthlearningidea. (Peter Kennett).

Underlying principles:

- Each sedimentary bed is formed by a single episode of deposition, which may be very quick (e.g. seconds) or may be very slow (e.g. centuries).
- Even though the sediments in a bedded sedimentary rock may have the same colour, the bedding planes can often be seen because weathering and erosion have highlighted the small differences between the upper part of one bed and the lower part of another.
- Some bedding planes were formed by small scale erosion or are highlighted by the sedimentary structures formed on them.
- Beds are sedimentary layers more than 1cm in thickness; layers that are thinner than this, as are often formed in silts and muds (and so siltstones and shales), are called laminations.

Thinking skill development:

Understanding the concept of how beds form involves construction. Linking the formation of beds in a measuring cylinder to bed formation and its effects in the 'real world' involves bridging. Discussion around why beds cannot be seen in sands of the same colour in a measuring cylinder but can be seen in sedimentary rocks of the same colour, involves cognitive conflict.

Resource list:

- transparent measuring cylinder, e.g. 200ml glass measuring cylinder in the lab or a 25ml plastic measuring cylinder in the field
- OR
- a small plastic bottle with the top cut off
 - enough sand of different colours (e.g. red and yellow) to make a series of beds
 - a spoon or scoop to add sand to the container

Useful links:

See the explanation of bedding at: <https://www.youtube.com/watch?v=TOUptgtxFhk>.

Source: Chris King of the Earthlearningidea Team.

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