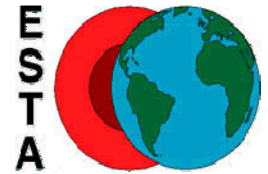




Modelling contact metamorphism using egg-white



Context & Aim:

Metamorphism is not a process that lends itself readily to laboratory demonstration. The most obvious “metamorphic change” (and the closest in reality to what happens in contact metamorphism) is the change from dried clay to pottery in a kiln; however, even this process involves the loss of water and other gases from the clay whereas, in most geological cases, rocks behave as closed chemical systems with no net loss or gain of elements.

In this demonstration, the cooking of egg-white in contact with a hot body provides a visible model of a metamorphic process in operation. Like all such models, its pros and cons are worth discussion.

For further information see web pages on metamorphism and Teachers' Background note: “Understanding metamorphism”.

Requirements:

Small glass trough, 250 ml pyrex beaker, kettle of boiling water, 2-4 egg-whites. It *may* be possible to project this demo (see Alternative) onto a screen by placing on an overhead projector – but try it first!

Procedure:

Place beaker centrally in glass trough and surround with egg-white.

Pour about 100ml boiling water from kettle into beaker and observe colour change as the egg cooks (metamorphoses) in contact with the hot beaker.

Alternative: Since egg-white beneath the beaker will inevitably cook and obscure the effect on the *surrounding* egg, an alternative heat source might be used; perhaps a cylindrical copper block that has been heated in boiling water.

Follow-up:

Discussion of the model can focus on a number of points, both positive and negative:

- the size of the cooked (metamorphosed) region will depend on the amount of heat energy available from the heat source (beaker or block); this in turn depends on how large, and how hot, it is to start with
- the change is isochemical – no material (or virtually none) is gained or lost as the egg changes colour
- egg-white is a liquid; whereas metamorphism involves changes that happen in the *solid* state Demonstrating such changes in solids is much more difficult (consider possible reasons?)

Footnote

This demonstration illustrates contact metamorphism quite well, but regional metamorphism involves pressure and directed stress in addition to heat. Since it is not possible to model all these processes together in the lab, the experiments associated with regional metamorphism in these web pages concentrate on the effects of stress on rocks – i.e. deformation.