

A particle model – change of state

Assessing learning

Learning Intentions <i>Students should:</i>	Evidence of Learning Statements <i>Students will be able to:</i>
<ul style="list-style-type: none"> understand a basic particle model of matter that can explain states of matter and changes of state 	<ul style="list-style-type: none"> use the model to explain changes of state

Why this item?

This activity is designed to provide evidence of students' ability to use a model in a scientific explanation.

The marbles are really a model of a model! (The particle-in-motion theory is a model and the marbles are models of particles.)

Ways to use the item

Students can work in groups and be asked to show how the model can be used to explain the properties of matter.

They can be asked to identify limitations of the model.

Evidence of learning

The model is a 2D representation of a 3D reality. Particles are not marbles, and so are not necessarily round, they are not made of glass and they do not move with the same speed as the marbles. There is no air, or other matter, between the particles of a substance in its various states.

Requirements

Each group needs:

- a shallow tray
- a number of marbles, about 1 cm in diameter
- a partition to fit the tray.

Source of item

This item was adapted from an activity in the Schools Council Integrated Science Project (SCISP) (<http://stem.org.uk/cxug>).

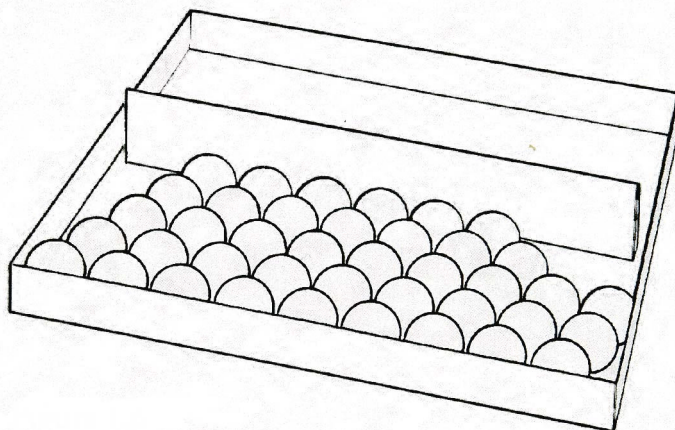
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Solids and liquids

Start with the tray flat on the bench with the barrier close to the marbles. Move the tray around in an irregular manner.

Show that you can use the tray and marbles to model the arrangement and movement of particles in a substance:

- in the solid state
- in the liquid state.

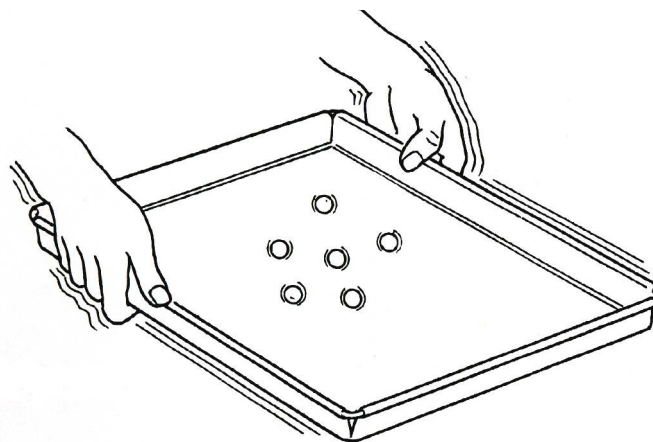


Gases and liquids

Put six marbles in the tray with no barrier. Keep the tray flat on the bench. Move the tray in an irregular manner.

Show that you can use the tray and marbles to model:

- the arrangement and movement of particles of a substance in the gas state
- the change from the gas state to the liquid state.



Quality of the model

You have been using the tray and marbles as a model to explain that the same substance can exist in three different states: solid, liquid and gas.

What is good about the model?

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In what ways could the model be misleading?

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