

## Application No. 409: Demonstrating Curie temperature

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### A way to clearly demonstrate the abstract Curie temperature

When a magnet is heated above a certain temperature, it will lose its magnetic properties. The application described here is a simple version of the Curie temperature ([de.wikipedia.org/wiki/Curie-Temperatur](http://de.wikipedia.org/wiki/Curie-Temperatur)) experiment known from school or university (where it is performed under very high temperatures and usually with nickel).

Caution: The described experiment will lead to the demagnetisation of the magnet swinging above the candle. In addition, copper conducts heat well. There is a risk of injury due to burns!

### Materials needed:

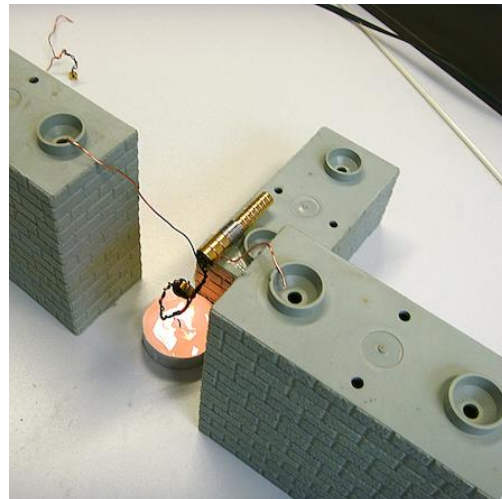
- copper wire
- a tealight
- a lighter or matches
- three plastic blocks
- ring magnets ([www.supermagnete.fr/eng/group/rings](http://www.supermagnete.fr/eng/group/rings)) – used here were magnets type R-10-04-05-G ([www.supermagnete.fr/eng/R-10-04-05-G](http://www.supermagnete.fr/eng/R-10-04-05-G)) or R-06-02-02-G ([www.supermagnete.fr/eng/R-06-02-02-G](http://www.supermagnete.fr/eng/R-06-02-02-G))

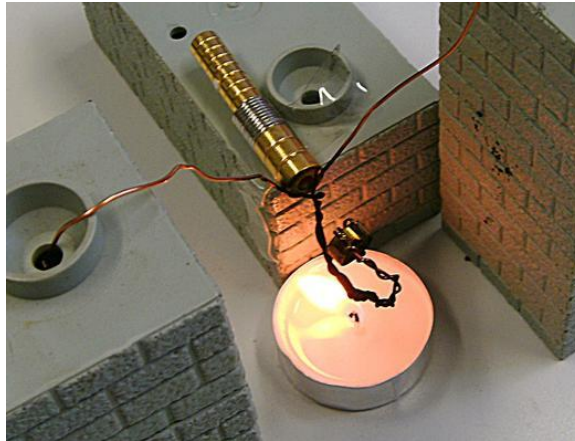


### Explanations and experiment set-up:

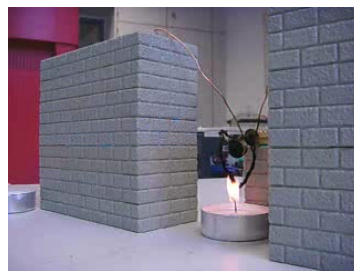
Copper is a diamagnetic material and is therefore not noticeably affected by magnets. Take a piece of copper wire, thread it through the hole of a ring magnet and twist the wire together to form a pendulum that rests loosely on two blocks.

The holder is built in such a way that the ring magnet dangles just next to the candle flame. But, if you move a stack of magnets of the same type closer (on a third block), the ring magnet is pulled over the candle and heated. Once the magnet gets too hot (temperature  $T > \text{Curie temperature } T_C$ ), it is initially only very weakly and ultimately no longer attracted by the magnet stack. Thus, the ring magnet on the copper wire swings back and away from the flame, leading to a cooling of the ring magnet. The cold magnet is then once again attracted by the magnet stack. This makes it magnetic again and the phenomenon repeats itself.





In the video, you can see that this effect can lead to a pendulum motion that is self-sustaining. One could say it is a very primitive motor (heat -> motion).



Video

*Note from the supermagnete team:*

Caution: Exposing the magnets to the intense heat over the flame can lead to their complete demagnetisation. We have published a FAQ page on the topic: What temperatures can magnets withstand? ([www.supermagnete.fr/eng/faq/temperature](http://www.supermagnete.fr/eng/faq/temperature))

#### **Articles used**

R-06-02-02-G: Ring magnet Ø 6/2 mm, height 2 mm ([www.supermagnete.fr/eng/R-06-02-02-G](http://www.supermagnete.fr/eng/R-06-02-02-G))

R-10-04-05-N: Ring magnet Ø 10/4 mm, height 5 mm ([www.supermagnete.fr/eng/R-10-04-05-N](http://www.supermagnete.fr/eng/R-10-04-05-N))

R-06-02-02-N: Ring magnet Ø 6/2 mm, height 2 mm ([www.supermagnete.fr/eng/R-06-02-02-N](http://www.supermagnete.fr/eng/R-06-02-02-N))

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