

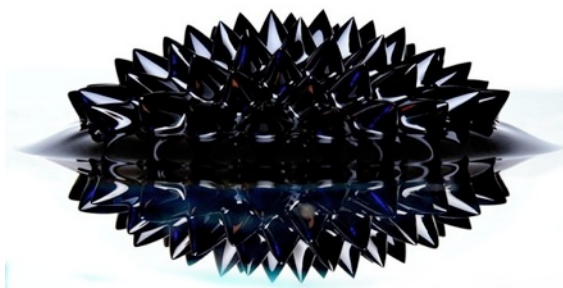
Ferrofluid

NANOTECHNOLOGY in ACTION!



WARNING!
CONTAINS BLACK FLUID WHICH STAINS ANYTHING.
KEEP AWAY FROM SMALL CHILDREN - NOT A TOY
WEAR PROTECTIVE GLOVES.

Non - hazardous chemical: Read MSDS on our website.



Ferrofluid responds dramatically to magnetic influence due to microscopic ferrous particles in the liquid, but the Ferrofluid itself is not magnetized in any way.

Ferrofluid is a stable colloidal suspension of nano-scale magnetic particles (magnetite, hematite) in a liquid carrier. The particles, which have an average size of about **100Å (10 nm)**, are coated with a stabilizing dispersing agent (*surfactant*) which prevents particle agglomeration even when a strong magnetic field gradient is applied to the ferrofluid. The surfactant must overcome the attractive Van der Waals and magnetic forces between the particles. A typical ferrofluid may contain by volume **5% magnetic solid, 10% surfactant** and **85% carrier**.

Demonstration

Carefully pour a small quantity of Ferrofluid into a glass petri dish or small glass beaker. (We recommend the beaker as it is less messy and easier to get the fluid back into its bottle). Use a strong magnet, such as our neodymium magnets. Never let the magnet come in direct contact with the Ferrofluid. While holding the dish securely, move the magnet closer to the bottom of the dish. Now slowly move it about the bottom. Be prepared to be amazed!

Magnetic Behavior of Ferrofluid

In the absence of a magnetic field, the magnetic moments of the particles are randomly distributed and the fluid has no net magnetization. When a magnetic field is applied to a ferrofluid, the magnetic moments of the particles orient along the field lines almost instantly. The magnetization of the ferrofluid responds immediately to the changes in the applied magnetic field and when the applied field is removed, the moments randomize quickly.

In a gradient field the whole fluid responds as a homogeneous magnetic liquid which moves to the region of highest magnetic flux. This means that ferrofluids can be precisely positioned and controlled by an external magnetic field.

Ferrofluid Today

Ferrofluid technology is well established and capable of solving a wide variety of technical problems. There are many successful applications of this engineering material and there is immense future potential. In many applications, ferrofluid is an active component that contributes towards the enhanced performance of the device. These devices are either mechanical (e.g., seals, bearings and dampers) or electromechanical (e.g., loudspeakers, stepper motors and sensors) in nature. In other cases, ferrofluid is employed simply as a material for nondestructive testing of other components such as magnetic tapes, stainless steels and turbine blades.

FerroFluid is manufactured by Ferrotec Corporation who has led the development of Ferrofluidic® technology since 1968.

Source: www.Ferrotec.com

Photo: Gregory Maxwell