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Brief 65-10335

NASA TECH BRIEF

Magnetic Fluid Readily Controlled in Zero Gravity Environment

The Problem: To produce a fluid that can be readily controlled in the absence of gravity or under reduced gravitational conditions.

The solution: A colloidal suspension of finely ground iron oxide in a fluid such as heptane, jet fuel (JP-4), or hydrazine. When used in controlled magnetic fields, the mixture can be pumped in the absence of gravity or can be used to simulate a wide range of gravity levels.

How it's done: A mixture composed of a fluid such as heptane, powdered magnetic iron oxide (Fe_3O_4), and a grinding agent such as 5% oleic acid is rotated at 48 rpm in a 1-quart stainless-steel-ball mill until the iron oxide is colloidally suspended and represents about 3% to 8% by weight of the mixture. The resultant low-viscosity magnetic colloid is decanted, leaving the larger particles of iron oxide that will not go into suspension to remain in the mill for future grinding. Iron oxide particles of less than 0.25 micron in diameter result in the formation of a true colloid.

Notes:

1. This colloid is readily controlled and directed magnetically. It will not separate on standing for long periods or after exposure to magnetic or centrifugal forces. Because of its low density and low viscosity, it is easily pumped.
2. This colloidal suspension should have application in the design of magnetic clutches and drives. It would be useful in conjunction with flow-measuring equipment, and as a trace medium in nondestructive testing.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio, 44135
   Reference: B65-10335

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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