

INVESTIGATION 1

PURPOSE

In this investigation you will experiment further with the magnetic properties of ferrofluids. More specifically, you will determine if any relationship exists between the “spiking phenomena” and the strength of the magnet used and the distance between the magnet and the fluid. In addition, you will observe the behavior of non-magnetic materials in contact with the fluid and in the field of a strong magnet.

PROCEDURE

- a. Pour enough ferrofluid into a Petri dish to just cover the bottom of the dish.
CAUTION! Ferrofluids cause stains that are difficult to remove from skin and fabrics.
- b. Slowly bring one end of a strong magnet up to the fluid from **below** the dish. Note the distance from the dish to the magnet when the first spike appears. Repeat using the other end of the magnet. **It is practically impossible to remove the ferrofluid from a strong magnet so avoid direct contact of the ferrofluid with the magnet.**
- c. Continue to move the magnet closer to the bottom of the dish, until it touches the dish, and note the pattern of spikes produced.
- d. Hold the magnet horizontally and slowly bring it up **underneath** the dish. Note the pattern of spikes.
- e. Place a penny in a Petri dish containing water. What happened to the penny?
- f. Bring the magnet up **underneath** the dish. What happened to the penny?
- g. Repeat (e) and (f) above using the ferrofluid instead of water.

FOLLOW-UP QUESTIONS

1. What factors would affect the distance observed in (b)?

2. For any given spike in the final pattern observed in (c), how many nearest neighbors does it have? Why do you think this particular pattern forms?

3. How do you explain the behavior of the penny in (f)? How would this behavior be different if the penny were magnetic?

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