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Overhead Masters

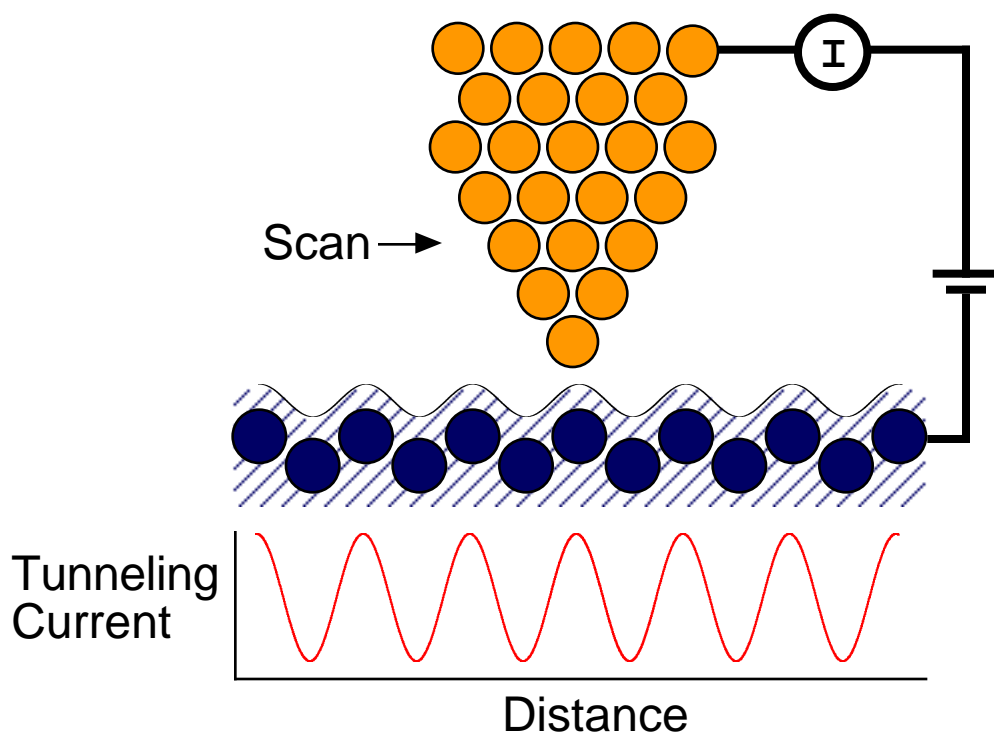
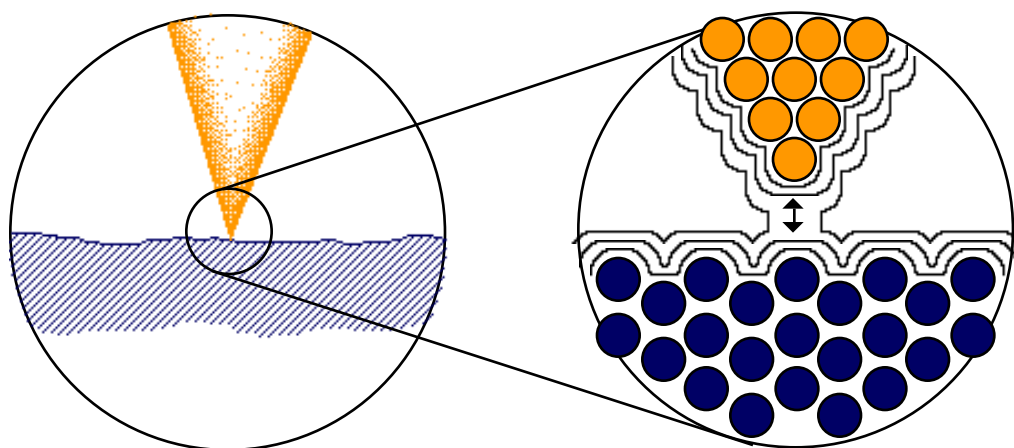
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Laboratory Safety

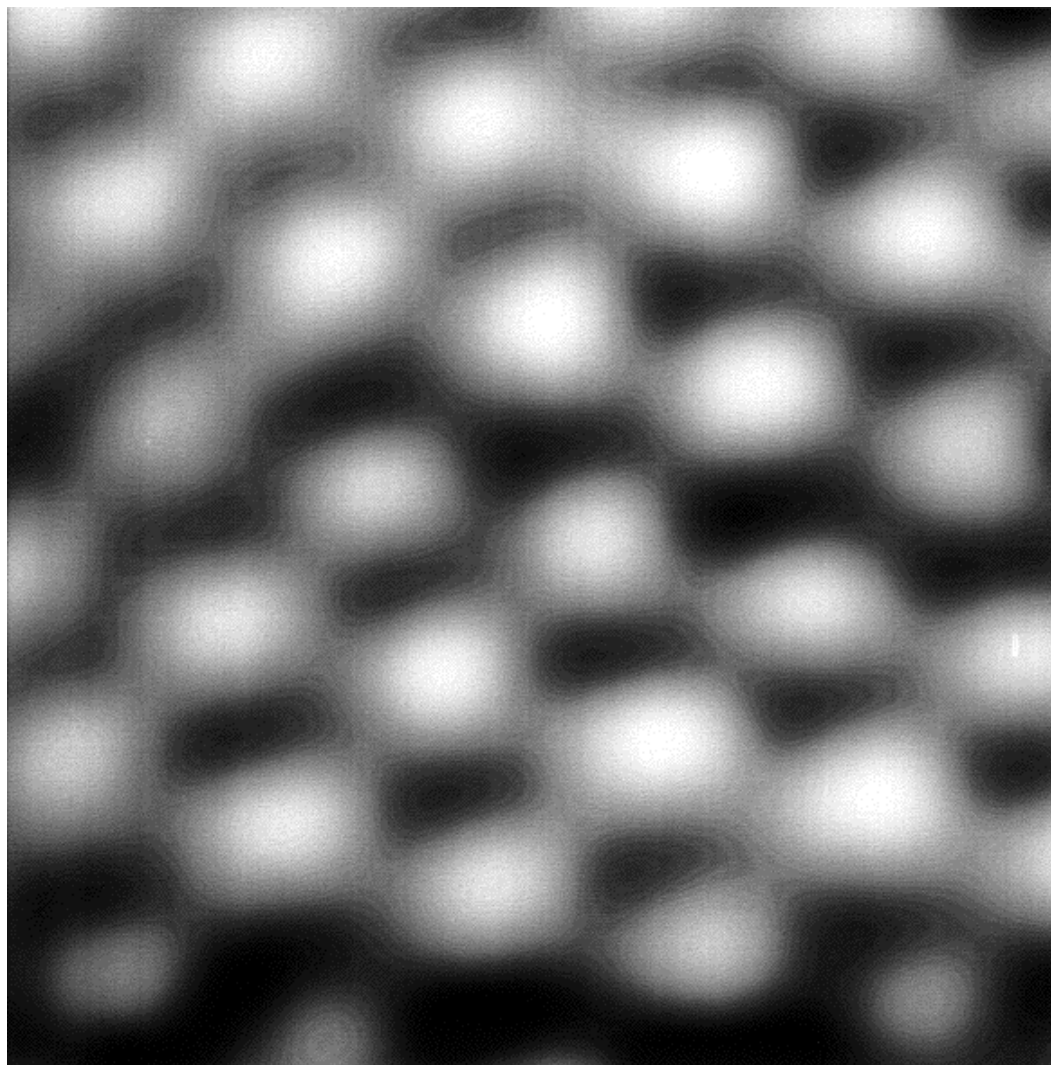
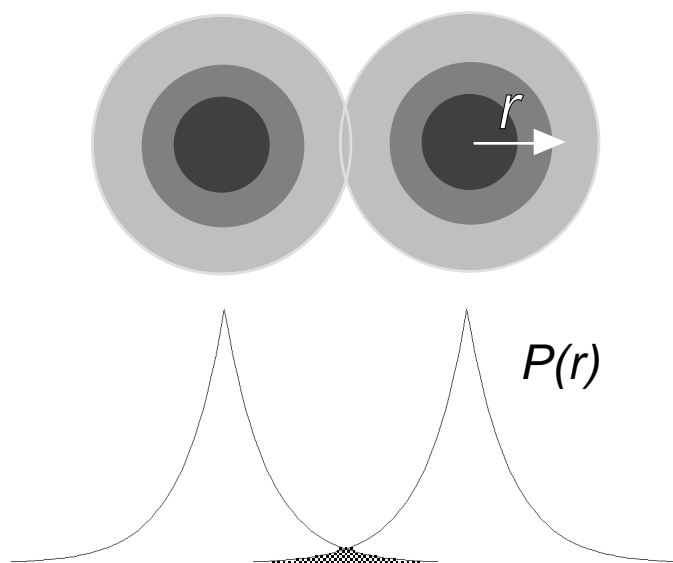
DISCLAIMER

Safety information is included in each chapter of the Companion as a precaution to the readers. Although the materials, safety information, and procedures contained in this book are believed to be reliable, they should serve only as a starting point for laboratory practices. They do not purport to specify minimal legal standards or to represent the policy of the American Chemical Society. No warranty, guarantee, or representation is made by the American Chemical Society, the authors, or the editors as to the accuracy or specificity of the information contained herein, and the American Chemical Society, the authors, and the editors assume no responsibility in connection therewith. The added safety information is intended to provide basic guidelines for safe practices. Therefore, it cannot be assumed that necessary warnings or additional information and measures may not be required. Users of this book and the procedures contained herein should consult the primary literature and other sources of safe laboratory practices for more exhaustive information. See page xxv in the Text 0 Preface file in the Companion Text folder for more information.

Scanning Tunneling Microscope



Electron Tunneling

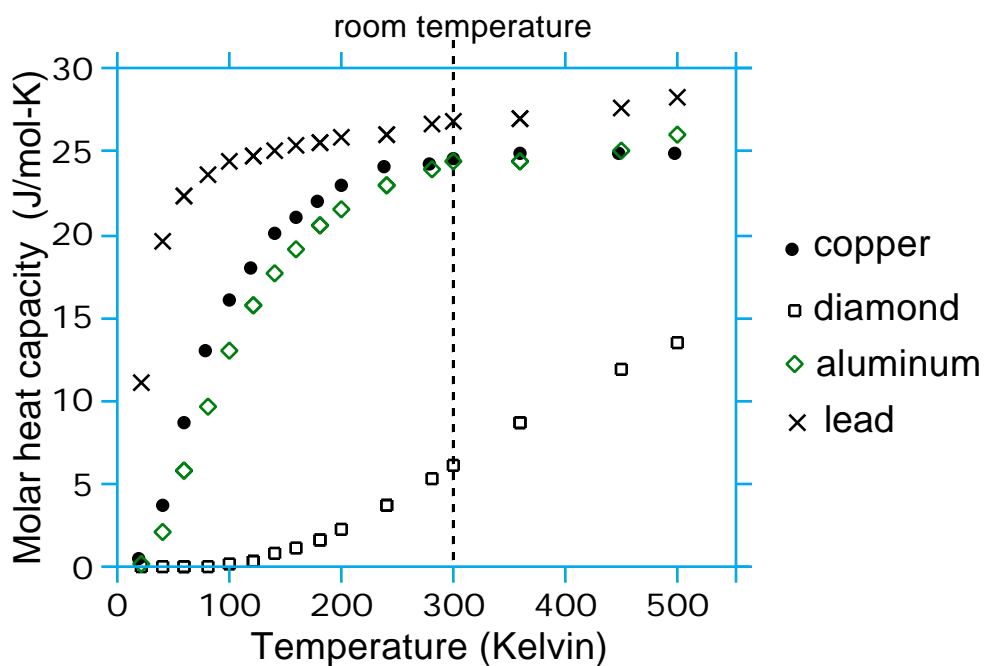


Heat Capacities

Molar Heat Capacities of Selected Solids at 298 K

Solid	Experimental Value	Theoretical Value
Al	24	25
Be	16	
Pb	26	
NaCl	55	50
MgO	44	
CaO	53	
CaF ₂	66	75
SiO ₂	73	
Na ₂ O	69	
KIO ₃	106	125
BaSO ₄	128	150

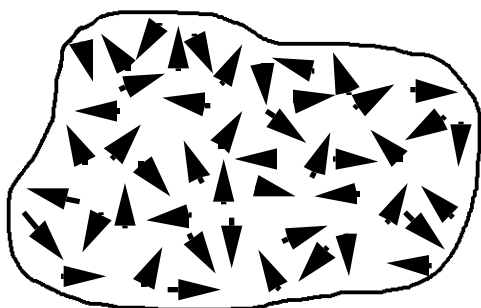
NOTE: All values are given in joules per mole-kelvin.



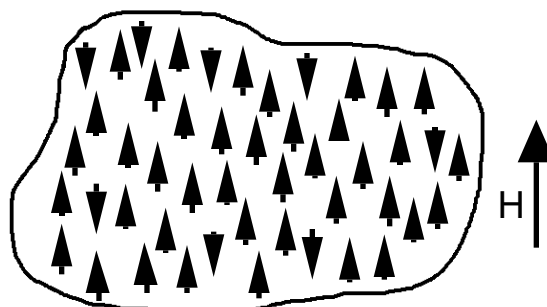
Electrons in Solid

Formula	Formal Mn Oxidation State	Number of Unpaired Electrons
Mn_2O_3	+3	4
MnO_2	+4	3
KMnO_4	+7	0

Paramagnetism

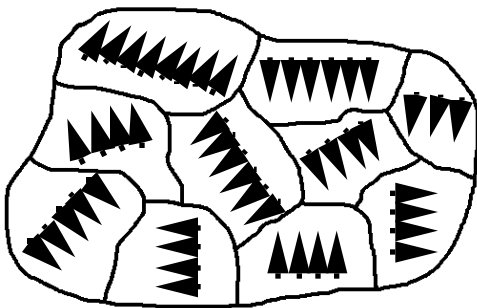


Spins are randomized by thermal energy.

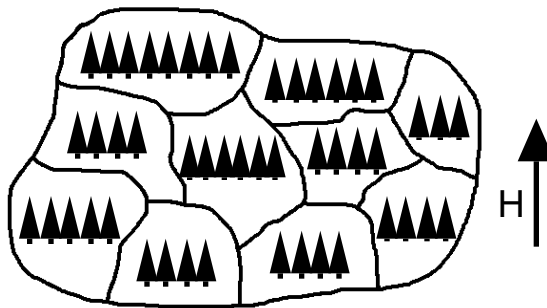


Spins are aligned with or against an applied magnetic field.

Ferromagnetism

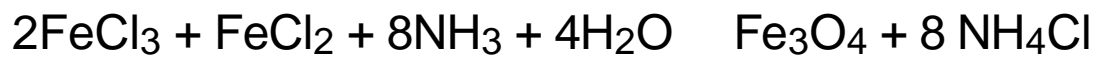


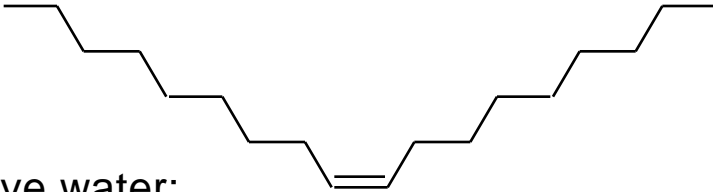
Spins are ordered in magnetic domains.



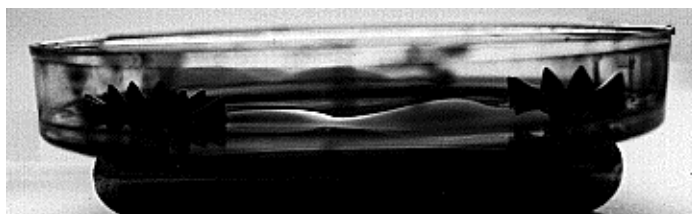
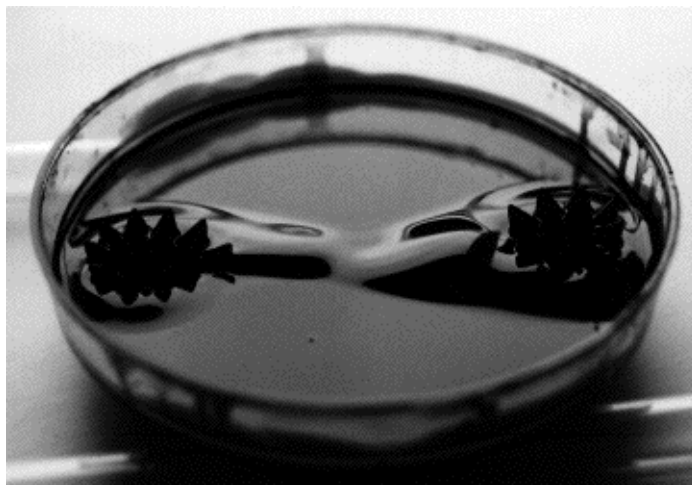
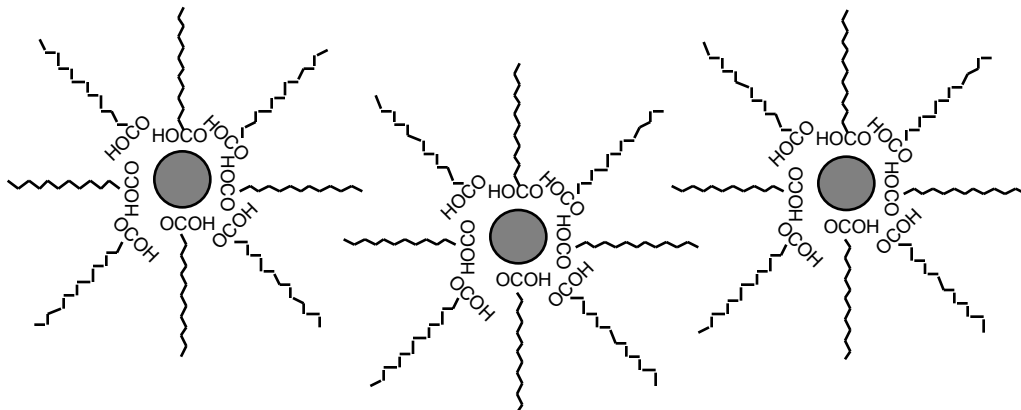
Spins are aligned with an applied magnetic field.

Ferrofluids

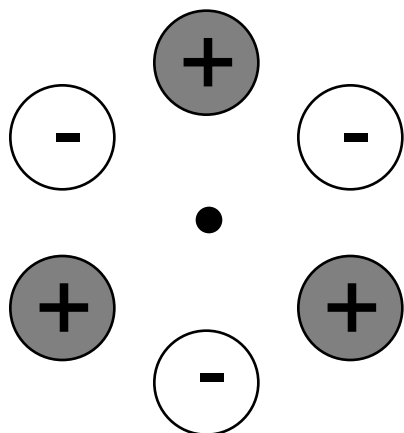


Add  in oil.

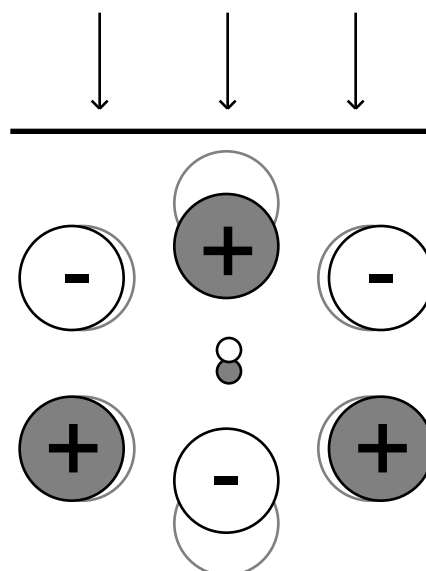
Remove water:



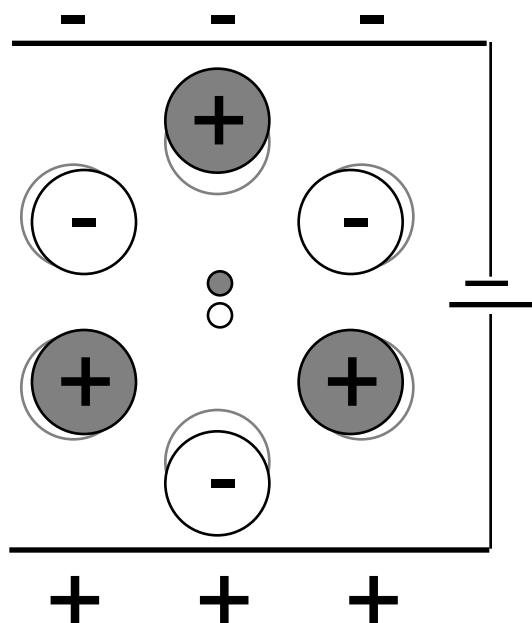
Piezoelectric Crystals



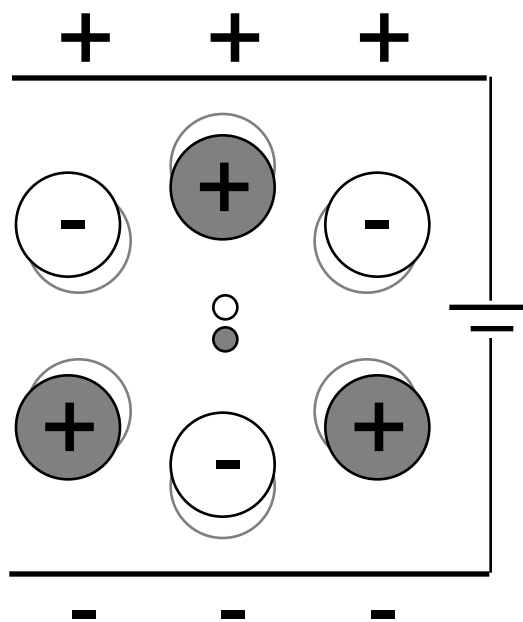
Equilibrium



Compressed

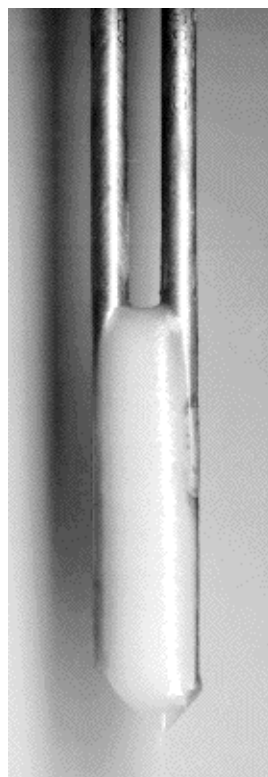
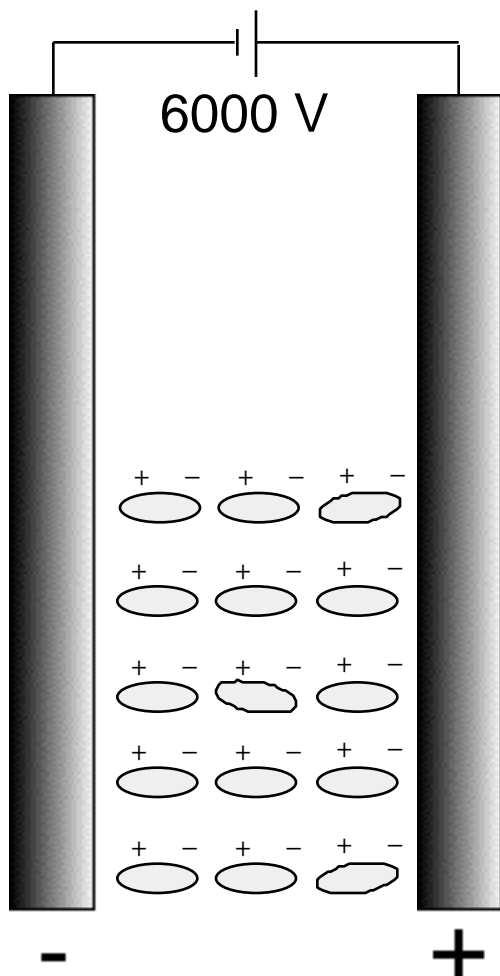


expansion



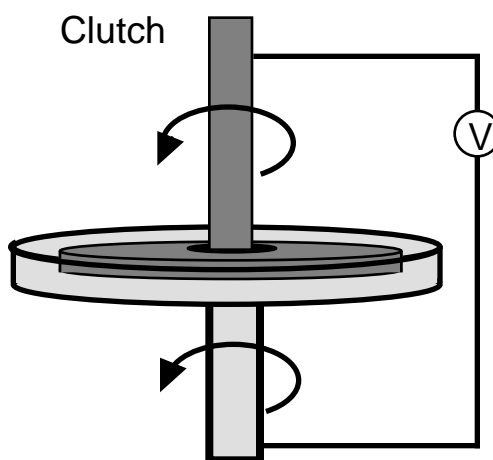
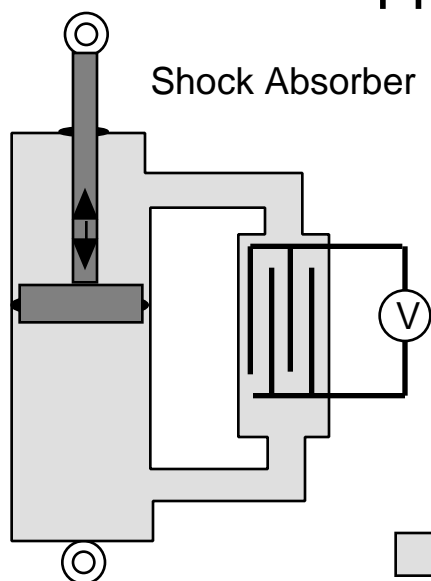
contraction

Electrorheology



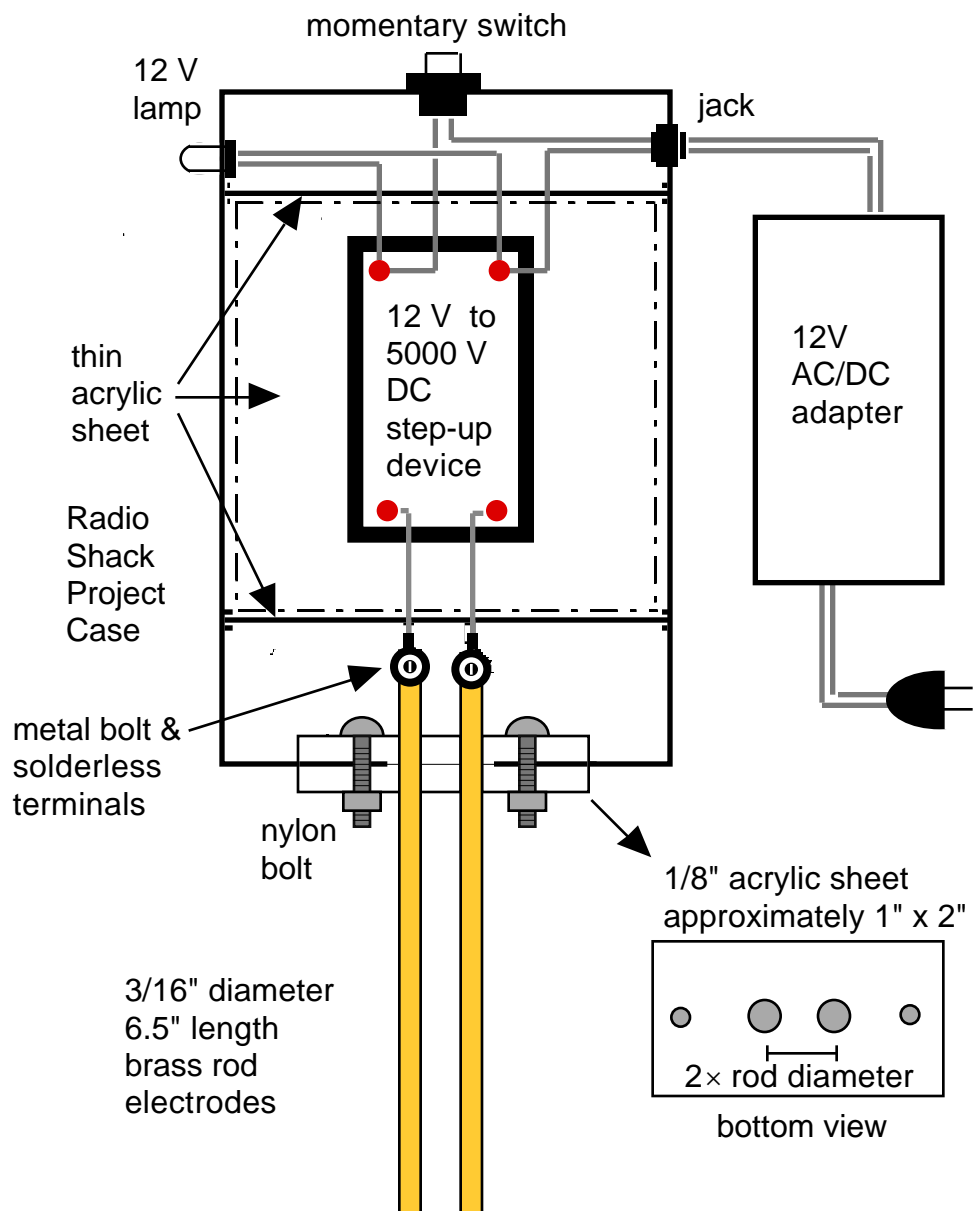
Flour in vegetable oil
Alumina in silicone oil
Silica in silicone oil

Applications

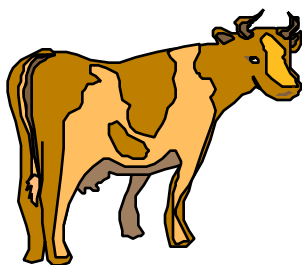
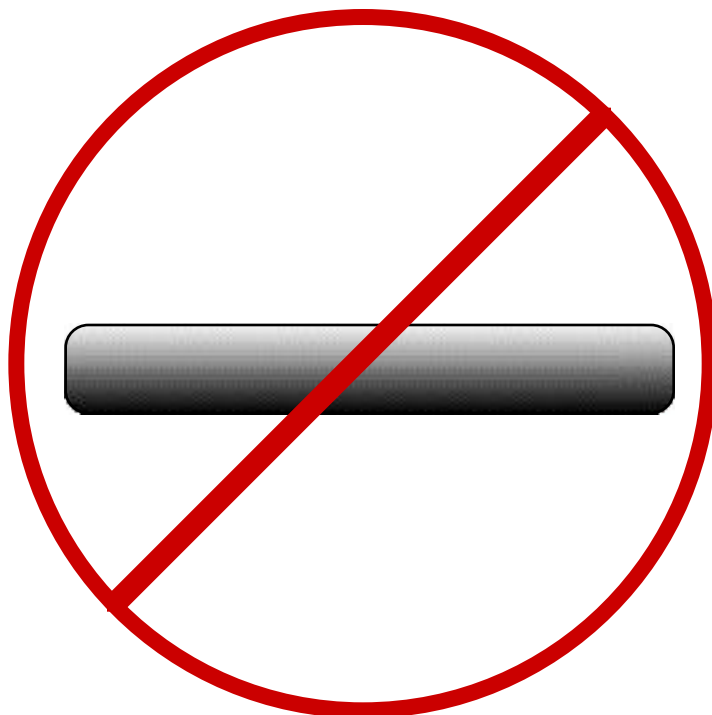


ER fluid

Electrorheology



Ferrofluids

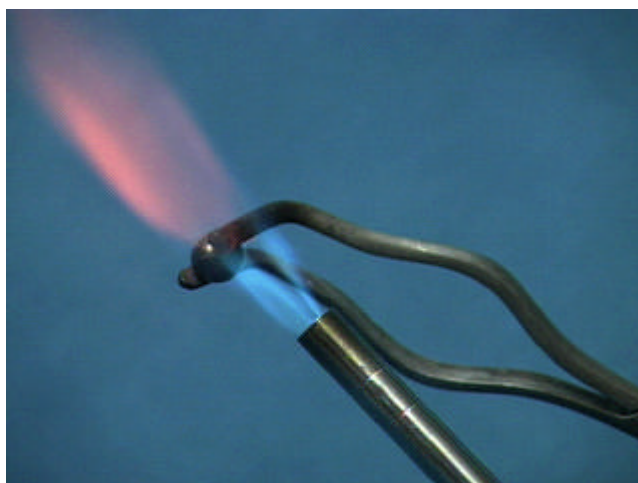


International symbol for no
flying cow magnets

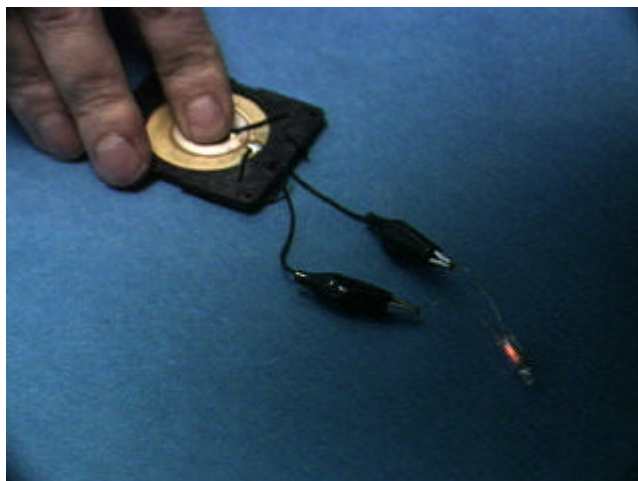


Please keep the magnet under the dish!

Nickel Curie Point



Piezoelectricity



Piezoelectric Speaker Element



Neon Bulb

Piezoelectric Lighter

