

Some quick conversions for magnetic units:

For geological materials, in the SI system:

**B** (Tesla) is magnetic induction,  $B_e$  ranges from 25,000 nT to 70,000 nT

**H** (A/m) is magnetic field intensity,  $H_e$  ranges from 20 A/m to 56 A/m

**J** (Tesla) is magnetization, ranges from  $10^1$  to  $10^4$  nT for rocks

**M** (A/m) is magnetic moment per volume, for basalt 1-10 A/m, for Earth  $7.6 \cdot 10^{22}$  A/m

k is magnetic susceptibility, k for magnetite is ~ 3.6, so a rock with 1% magnetite has k ~.04 SI

$\mu_0$  is the permeability of free space,  $4\pi \cdot 10^{-7}$  h/m

**B**, **H**, **J**, and **M** are vectors.

The above are related like this:

$$\mathbf{B} = \mu_0 * (\mathbf{H} + \mathbf{M})$$

$$\mathbf{J} = \mu_0 * \mathbf{M}$$

$$\mathbf{B} = \mu_0 * \mathbf{H} + \mathbf{J}$$

$$\mathbf{m} = k * \mathbf{H} = \mathbf{J} / \mu_0$$

$$\mathbf{H} = \mathbf{B} / \mu_0 - \mathbf{m}, \text{ inside a material}$$

$$\mathbf{H} = \mathbf{B} / \mu_0, \text{ outside a material}$$

To convert SI to cgs (or vice versa):

SI	CGS
B, Tesla	$10^4$ Gauss
H (A/m)	$4\pi \cdot 10^{-3}$ oersted
m, (A/m)	$10^{-3}$ emu/cm <sup>3</sup>
k (dimensionless) 1	$1/4\pi$ cgs

Imagine a basalt with SI magnetization of 1 A/m, to get to emu/cm<sup>3</sup>:

$$1 \text{ A/m} * 1/(\text{A/m}) / (10^{-3} \text{ emu/cm}^3) = .001 \text{ emu/cm}^3.$$