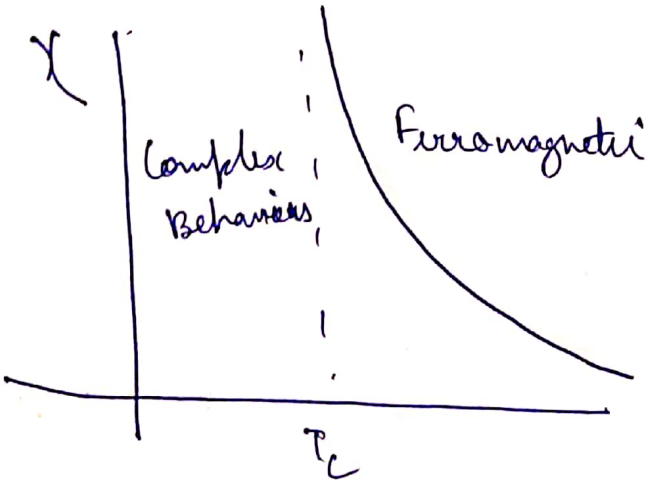
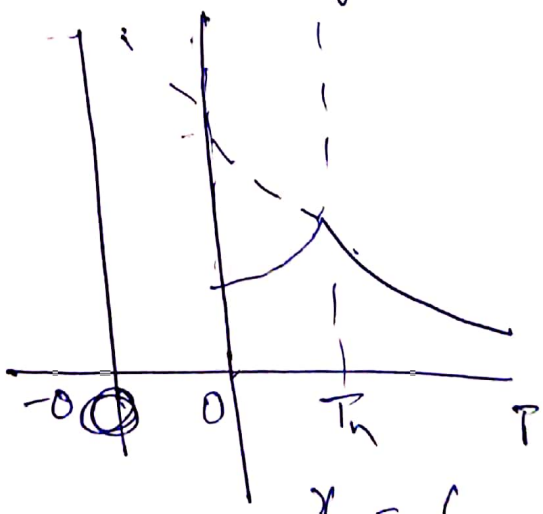
Harshit Nawandia 2020CS10248

Q.1) We know that Antiferromagnetic substance follows Curie-Weiss law that $\chi = \frac{C}{T+\theta}$ when $T > T_N$ where T_N is Neel temperature while ferromagnetic substance do not. So we can keep decreasing the temp and check the behaviour of the two substance to find which one is antiferromagnetic and which one is ferromagnetic.

Also if we check for the M vs H graph we can see that ferromagnetic substance do not follow a linear graph when initially M is 0



$$\chi = \frac{\sigma C}{T - T_C}$$



$$\chi = \frac{C}{T+\theta}$$

$T > T_N$

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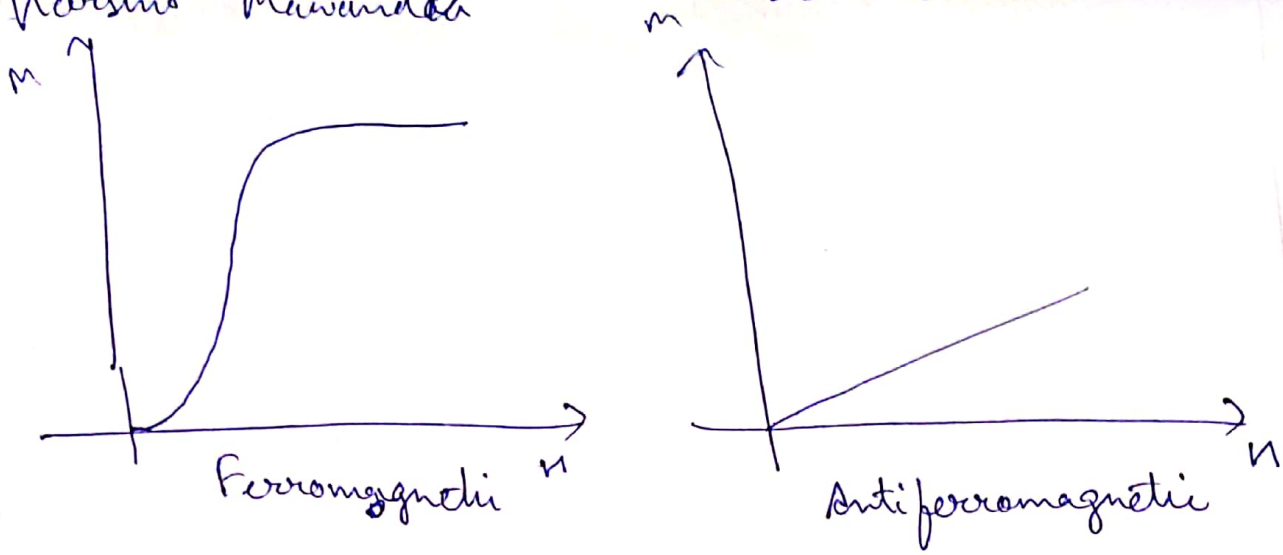
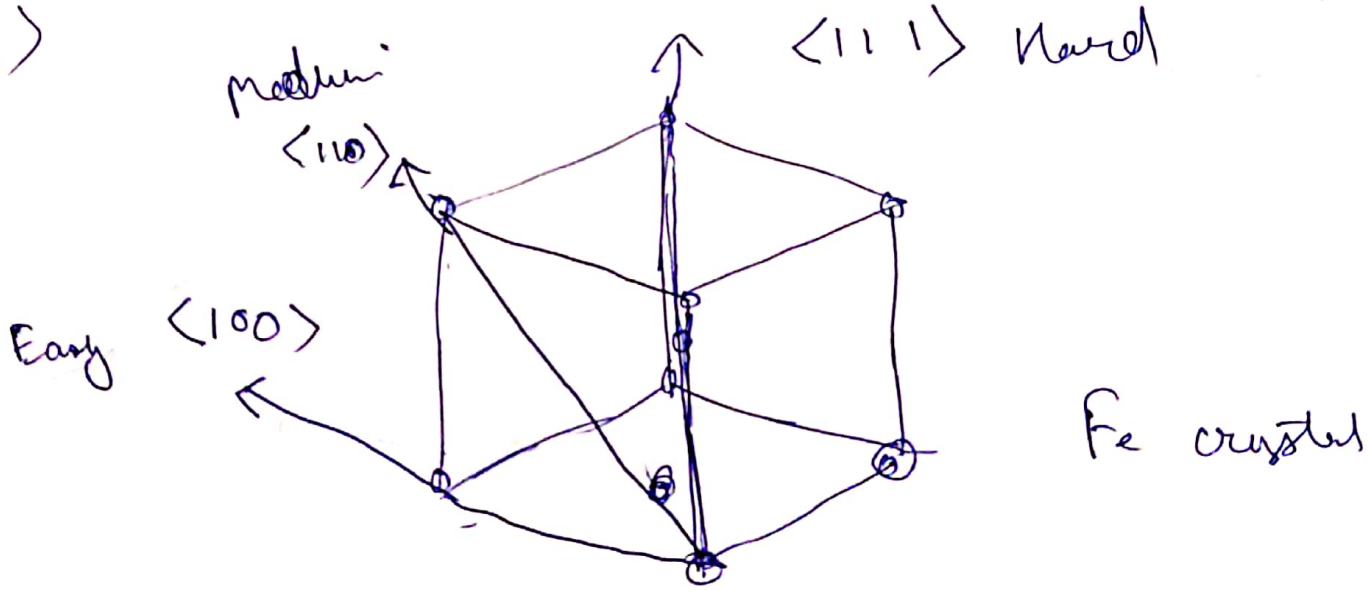


b) ~~When~~ When the magnetic properties of a substance are different in the crystal depending on the crystallographic direction in which an external field is applied, the phenomenon is called magnetic anisotropy.

Eg)



Fe crystal

When H is along <100> direction, magnetization increases rapidly and saturates.

To magnetize the crystal along <111> direction, a stronger field has to be applied

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The physical origin is that when the density of atoms is higher in any direction, it is more difficult to magnetize the crystal with a field in that direction.

~~Harshit~~

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