

Collocvium tasks: Magnetism.

- 1.1 What types of magnetic materials do we have?
- 1.2 Write the Curie-Weiss law and explain how the constant (θ) varies for the different types of magnetisms.
- 1.3 Calculate the magnetic dipolemoment for the ions: V^{3+} , Cr^{3+} , Mn^{3+} (HS), Ni^{2+} .

1.4 Why is Fe a ferromagnetic metal and Cu not?

1.5 What is the superexchange mechanism?

How does this explain that MnO, FeO, CoO and NiO (all adopt the NaCl-type structure) are antiferromagnets?

Why does the T_N increase in temperature for the series MnO \rightarrow NiO?

1.6 What is the double exchange mechanism?

How does this explain that $(La_{0.67}Ca_{0.33})MnO_3$ is a ferromagnet?

The compound adopts a slightly distorted perovskite ABO_3 structure where Mn occupies the B positions (octahedral environment). These octahedra are connected by their corners in the same type as in the ReO_3 structure.

Will the ferromagnetism increase or decrease if the octahedrons were rotated with respect to each other?

1.7 What is Pauli paramagnetism?

Or; why are most metals paramagnetic and not diamagnetic?

1.8 What is superparamagnetism?

Or; why can't they make hard disks of 10 TB?