

Rain-out model

The **rain-out model** is a model of planetary science that describes the first stage of planetary differentiation and core formation. According to this model, a planetary body is assumed to be composed primarily of silicate minerals and NiFe (i.e. a mixture of nickel and iron). If temperatures within this body reach about 1500 K, the minerals and the metals will melt. This will produce an emulsion in which globules of liquid NiFe are dispersed in a magma of liquid silicates, the two being immiscible. Because the NiFe globules are denser than the silicates, they will sink under the influence of gravity to the centre of the planetary body—in effect, the globules of metal will "rain out" from the emulsion to the centre, forming a core.

According to the rain-out model, core formation was a relatively rapid process, taking a few dozen millennia to reach completion. This occurred at the end of a lengthy process in which the planets were assembled from colliding planetary embryos. Only the collisions of such large embryos could generate enough heat to melt entire bodies. Furthermore, it was only after all of the iron and nickel delivered by impacting bodies had arrived that core formation could proceed to completion.

However, this process of core formation was preceded by a long period of partial differentiation, in which some of the nickel and iron within the planetary embryos had begun to separate.

The rain-out model can be invoked to explain core formation in all the terrestrial planets, given that these consist primarily of silicates, nickel and iron. It can also be adapted to account for core formation in smaller bodies composed of ices and silicates. In such a case, it would be the denser silicates which would rain out to form a rocky core, while the volatile components would form an icy mantle.

See also

- Iron catastrophe

References

- McBride, Neil; Iain Gilmour; Philip A. Bland; Elaine A. Moore; Mike Widdowson; Ian Wright (2004). *An Introduction to the Solar System* (<https://books.google.com/books?id=cO3OaBTYuEgC>). Cambridge: Cambridge University Press. pp. 56–57. ISBN 0-521-54620-6.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Rain-out_model&oldid=812780075"

This page was last edited on 29 November 2017, at 20:37 (UTC).

Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.