

Shukla Gas-Rock Theory (SGRT): Distribution of Elements in Planets Due to Contribution of Nebula Theory and Solar Magnetism in Planet Formation

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Abstract:

The traditional nebula theory of planet formation states that about 4.6 billion years ago, there was a huge cloud of gas and dust (solar nebula) around the Sun, from which planets and satellites were formed. However, this theory explains the process of formation of planets but, it is not able to fully explain the distribution of elements in planets.

Keywords- nebula, sun magnetism, composition of planet.

Shukla Gas-Rock Theory (SGRT) proposes that –The particles of the nebula were affected not only by gravitational concentration but also by the solar magnetic field. After the formation of the Sun, not only its gravity was active but its magnetism was also playing an active role in planet formation. When gravity started revolving the nebula around itself in a certain orbit, at the same time, the particles of the nebula started getting pulled towards the Sun by the magnetism of the Sun. Due to which they got arranged in the order of metal, rock and gas respectively from near the Sun.

Introduction

- Traditional model (Nebular Hypothesis) → Formation of planets from dust and gas cloud.
- Problem → Distribution of metal and gas is not fully explained.
- Contribution of SGRT → It adds that solar magnetism played a decisive role in the organization of dust particles and we can understand the distribution of elements properly.

Main points of SGRT (Theory Points)

1. Nebula state and initial condensation

- o- The solar system was formed from a huge dust-gas cloud (solar nebula).
- o- The particles of the cloud started colliding and joining each other (planetesimal formation)
- o- At this time, the particles which contained metallic elements like Fe, Ni, co, Fe_3O_4 , SiO_2 , got

partially ionized and were attracted and arranged by the solar magnetic field.

Result → Metal and rocky planets near the Sun, while gas-dominated planets far away.

2. Magnetic effect and planet formation

O Rock and metal particles (with magnetic susceptibility) got arranged in the direction of the solar magnetic field.

- This process led to the formation of planetesimals.

Later these planetesimals became larger planets by gravitational fusion.

3. Distribution of gases

- Light elements like H_2 and He spread far and wide in the nebula and accumulated in large quantities in the outer planets.
- Their quantity remained low on the inner planets due to lower magnetic attraction.

Note: At present, there is no data available on NASA or reputed institutions regarding the distribution of Fe, Co, Ni, Fe₃O₄, SiO₂ etc. in the planets. But the research done at present supports my theory :-

Supporting Research

- Blum & Wurm (2008, Annual Review of Astronomy and Astrophysics) → Dust particles join together to form planetesimals.
- Hubbard (2016, Astrophysical Journal) → Discussion on the effect of magnetic fields in early nebulae.
- McNally et al. (2020, Nature Astronomy) → Dust particles in protoplanetary disks are affected by magnetic fields.

Conclusion

- SGRT shows that not only gravity, but also solar magnetism was decisive in planet formation.

- The presence of more rock in the inner planets and the dominance of gas in the outer planets can be explained by this mixed process.
- This view does not negate the nebula theory, but adds a “missing link” to it.
- Based on this research, in future, we can tell which element is present on which planet.

Sources / References

- * ESA [Planetary Science Archive]
- * Blum, J., & Wurm, G. (2008). [The Growth Mechanisms of Macroscopic Bodies in Protoplanetary Disks. Annual Review of Astronomy and Astrophysics].
- * Hubbard, A. (2016). [Magnetic Effects in Protoplanetary Disks. Astrophysical Journal.]
- * McNally, C. P., et al. (2020). [Magnetic field effects on dust evolution in protoplanetary disks. Nature Astronomy.]