**Answer on** Question #69701, Physics / Astronomy | Astrophysics

Derive Jeans criteria for the stability of a gas cloud. A collapsing cloud is made only of neutral hydrogen (H1). If the temperature of the cloud is 50 K and its number density is 10^5 m−3, calculate its Jeans mass.

**Solution:**

The corresponding mass required for collapse is calculated from the equations for the Jeans radius:

$-$ $-$ $-$ $-$ (1), where ⸺ , − , kg,

$R_J$ is the critical radius ("Jean's radius"), $M_J$ is the Jeans mass, T is the temperature of the cloud

Of (1) $\Rightarrow$ $M_J = -\dfrac{b}{\quad}R_J$ (2)

Critical radius $R_J$: $\quad \alpha$ ⸺ (3), where $\alpha$ ⸺ , $n_H$ is the densitie of the cloud

Of (3) $\Rightarrow$ $R_J = 4.7 \times 10^{18}$ m (4)

(4) in (2): $M_J = 7.3 \times 10^{34}$ kg

**Answer:**

$7.3 \times 10^{34}$ kg

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