

**Answer on Question #40679, Physics, Mechanics | Kinematics | Dynamics**

**Question:**

A bacteria of mass  $2 \times 10^{-24}$  kg is rotated in a centrifuge at an angular speed of  $4\pi \times 10^3$  rad s<sup>-1</sup>. It is situated at a distance of 5 cm from the axis of rotation. Calculate the effective value of  $g$  relative to the rotating frame of reference and the net centrifugal force on the bacteria.

**Answer:**

Centrifugal acceleration (effective value of  $g$ ) equals:

$$a = \omega^2 r = 7.9 \cdot 10^6 \frac{m}{s^2}$$

where  $\omega$  is angular speed,  $r$  is distance from the axis of rotation.

Net centrifugal force on the bacteria equals:

$$F = ma = 1.6 \cdot 10^{-17} N$$

where  $m$  is mass,  $a$  is acceleration

Answer:  $a = 7.9 \cdot 10^6 \frac{m}{s^2}$ ,  $F = 1.6 \cdot 10^{-17} N$