Answer on Question #63187, Physics / Solid State Physics

A powerful motorcycle can accelerate from 0 to 30.0 m/s (about 108 km/h) in 4.20 s. What is the angular acceleration of its 0.320-m-radius wheels?

Solution:

The linear acceleration is

 $a_t = \Delta v / \Delta t = 30.0 \text{ (m/s)} / 4.20 \text{ (s)} = 7.14 \text{ m/s}^2$.

We also know the radius of the wheels.

Entering the values for a_t and r into $\alpha = a_t / r$, we get

 $\alpha = a_t / r = 7.14 (m/s^2) / 0.320 (m) = 22.3 rad/s^2$

Answer: 22.3 rad/s²

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