

Visualize free electrons moving through a crowded medium. They collide with the atoms along the way.

As the temperature increases, what will happen to the average collision time, τ ?

What will happen to the resistivity, ρ ?

- 1) τ increases, and ρ increases.
- 2) τ decreases, and ρ increases.
- 3) τ increases, and ρ decreases.
- 4) τ decreases, and ρ decreases.

When the temperature is increased, the atoms in the medium are “vibrating” with faster average speed. Free electrons will collide with atoms more frequently. So the average collision time τ is decreased.

The resistivity $\rho = \frac{m}{n q^2 \tau}$; i.e., ρ is inversely proportional to τ . As the

collision time decreases, resistivity increases.

Answer 2.

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