## Answer on Question 65351, Physics, Electric Circuits

## **Question:**

You were given a pendant on Valentine's Day, and you wonder whether it is worth anything more than emotional value. You attach it to a 1.50 V battery along with an ammeter in series so that you can measure the current through the pendant, which turns out to be a whopping  $4.72 \cdot 10^5 A$ . Based on the pendant being 2.00 cm long and having an assumed cross section of  $1.00 \text{ cm}^2$ , determine the resistivity of the pendant. Determine what substance the pendant is made from, assuming was done at a temperature of 20°C.

## Solution:

We can find the resistivity of the pendant from the formula:

$$\rho = R \frac{A}{l},$$

here,  $\rho$  is the resistivity of the pendant, R is the resistance of the pendant, A is the crosssectional area of the pendant and l is the length of the pendant.

We can find the resistance of the pendant from the Ohm's law:  $R = \frac{V}{I}$ ,

here, V is the voltage across the pendant, I is the current through the pendant.

Substituting *R* into the first formula, we get:

$$\rho = R \frac{A}{l} = \frac{V}{I} \cdot \frac{A}{l} = \frac{1.50 V}{4.72 \cdot 10^5 A} \cdot \frac{1.0 \cdot 10^{-4} m^2}{2.0 \cdot 10^{-2} m} = 1.59 \cdot 10^{-8} \Omega \cdot m.$$

Finally, from [1] we can determine the substance the pendant is made from - it is the silver.

1. David Griffiths (1999). *Introduction to Electrodynamics* (3rd ed.). Upper Saddle River, New Jersey: Prentice Hall, p.286.

## Answer:

 $\rho = 1.59 \cdot 10^{-8} \,\Omega \cdot m$ , the pendant is made from the silver.

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