1 **(a)** A student sets up the circuit shown in Fig. 1.1 to determine the resistivity of the metal of a resistance wire. He reads the current I from the ammeter and the potential difference V from the voltmeter.

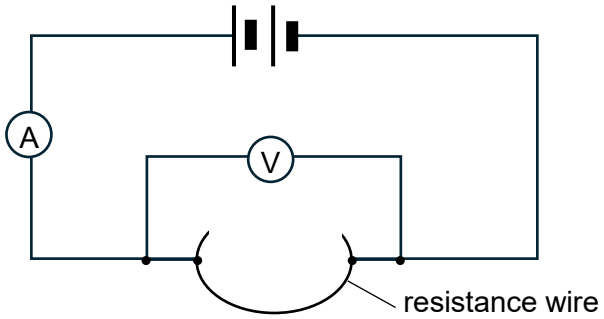

Fig. 1.1

(i) Determine the base units for resistance.

base units for resistance: ..... [2]

(ii) The following readings were obtained for the experiment:

Reading of voltmeter = 1.30 ± 0.01 V
Reading of ammeter = 0.76 ± 0.01 A
Length of wire = 75.4 ± 0.2 cm
Diameter of wire = 0.54 ± 0.02 mm

Calculate, with its associated uncertainty, the value of the resistivity of the metal of the resistance wire, expressing your results to an appropriate number of significant figures.

ρ = ... ± ..... [4]

(b) A second student repeated the experiment in **(a)** with the same length of the wire. In this new experiment, the supply voltage was varied and several pairs of corresponding readings on the voltmeter and ammeter were tabulated. A graph showing the variation of the current in the wire with potential difference across the wire was then plotted.

Discuss how this procedure reduces the random error and systematic error that could have occurred.

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[2]

[Total: 8]