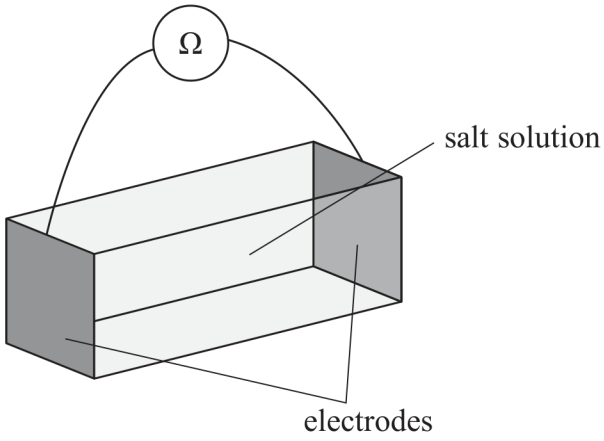
2 A student investigated how dissolving salt in water affects the electrical resistivity of the water.

The student dissolved a known mass m of salt in a known volume of water to make a salt solution.

She filled a container with the salt solution.

The container of length l had an electrode at each end of cross-sectional area A. She connected an ohmmeter between the two electrodes, as shown.



After measuring the resistance R of the salt solution with the ohmmeter, she calculated the resistivity ρ of the salt solution.

(a) When salt dissolves in water, the salt breaks down into ions. The salt ions are charge carriers.

The student predicted that the resistivity of the salt solution would decrease as m increased.

Justify her prediction.

(3)

.....

.....

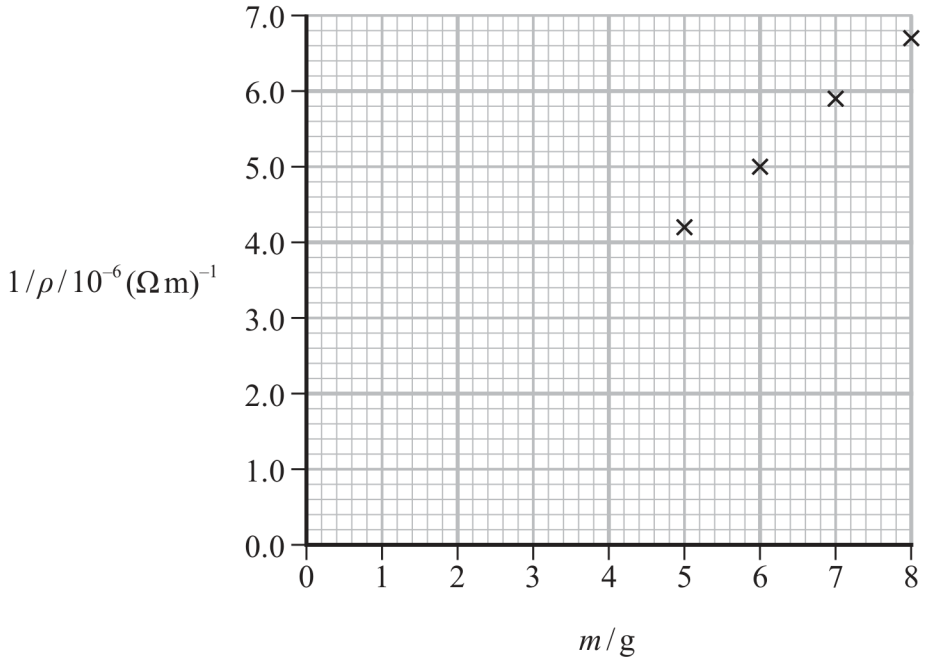
.....

.....

.....

.....

(b) The student repeated the procedure for different values of m and plotted a graph of $1/\rho$ against m.



(i) The student wrote the following conclusion.

The resistivity of the salt solution is inversely proportional to the mass of salt dissolved in the sample.

Explain how the graph supports the student's conclusion.

(3)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(ii) Give two reasons why the graph may not support the student's conclusion.

(2)

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

DO NOT WRITE IN THIS AREA