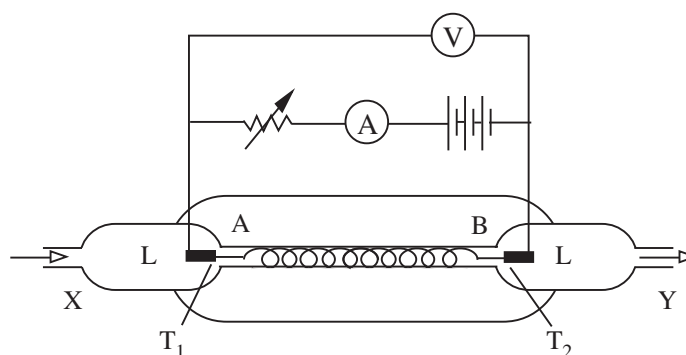


1992 A/L Structured Essay Question No (02)

The diagram shows an experimental setup used to determine the specific heat capacities of different liquids. The liquid entering into the narrow tube AB through the inlet X will flow at a constant rate and will flow out through the outlet Y . The narrow tube AB is enclosed in a vacuum.

The liquid is heated with the current flowing through the heating coil PQ , which has been made with thin wire. T_1 and T_2 are two thermometers used to measure the temperature at the inlet and the outlet.



- (a)(i) What is the reason for using thin wires in the heating experiments in order to generate heat.

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- (ii) The thin wire is connected to the external circuit with the thick bands (L). Give reasons for using the thick bands.

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- (b) What is the use of enclosing the narrow tube in a vacuum?

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- (c)(i) An additional instrument is required to maintain a constant flow rate in the tube. Draw a labelled diagram of a such setup close to the above diagram indicating how it is connected to the inlet X of the tube.

(ii) Using a very high liquid flow rate will reduce the accuracy of the final result. Provide reasons for the reduction in accuracy.

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(d)(i) What is the other important reading that should be taken apart from the voltmeter reading (V), ammeter reading (I), temperature at the inlet (θ_1) and the temperature at the outlet (θ_2). (Let's call it α)

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(ii) Give the names of the instruments used to take the measurement stated in (d) (i) above.

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(iii) At what instance should these measurements be taken.

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(e) Assuming that there is no heat loss to the environment, obtain an expression for the specific heat capacity of the liquid, in terms of the quantities stated in (d) (i) above.

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