7 The diagram shows part of a device used to demonstrate electrostatic charge.

water in

metal bucket A   V   B metal bucket

rubber mat
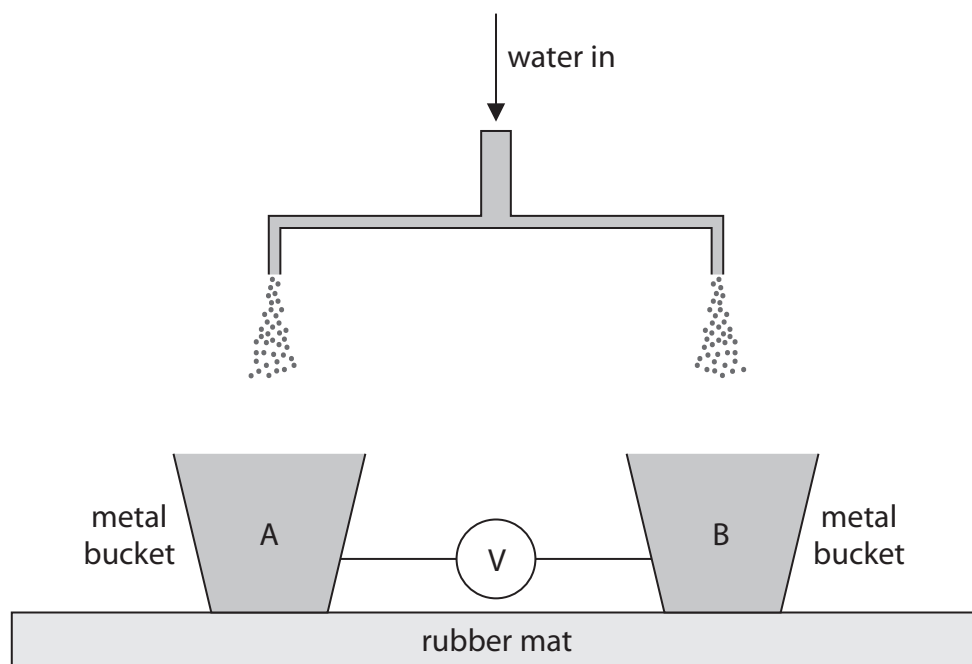
(a) Negatively charged water droplets fall into bucket A.

Describe how bucket A becomes negatively charged.

(2)

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....

....

....

(b) Explain why the negatively charged droplets spread out as they fall.

(2)

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(c) (i) A droplet hits bucket A with a speed of 3.8 m/s.

Calculate the kinetic energy of the droplet when it hits bucket A.

[mass of droplet = 6.2×10^{-9} kg]

(3)

kinetic energy = ... J

(ii) The total charge stored in bucket A is -1.1×10^{-10} C.

This charge passes through the air between the buckets in 9.2×10^{-3} s, causing a spark between bucket A and bucket B.

Calculate the mean current between the buckets.

(3)

mean current = ... A

(iii) The spark transfers a charge of -1.1×10^{-10} C.

The mean voltage between the buckets is 1.7 kV.

Calculate the energy transferred by the spark.

(3)

energy transferred = ... J

(Total for Question 7 = 13 marks)