13 A weather balloon takes scientific equipment high into the atmosphere to monitor atmospheric conditions.

A weather balloon is filled with hydrogen at a temperature of 22.5 °C and a pressure of 1.02×10^5 Pa. The volume of the balloon is 7.50 m^3.

The balloon rises through the atmosphere to a maximum height. At the maximum height, the temperature of the hydrogen in the balloon is –48.0 °C and the pressure of the hydrogen in the balloon is 8.40×10^4 Pa.

(a) Calculate the volume of the balloon at the maximum height.

(3)

Volume of balloon = ...

(b) Calculate the decrease in the mean kinetic energy of a hydrogen molecule in the balloon as the balloon rises to the maximum height.

(2)

Decrease in mean kinetic energy = ...

(Total for Question 13 = 5 marks)