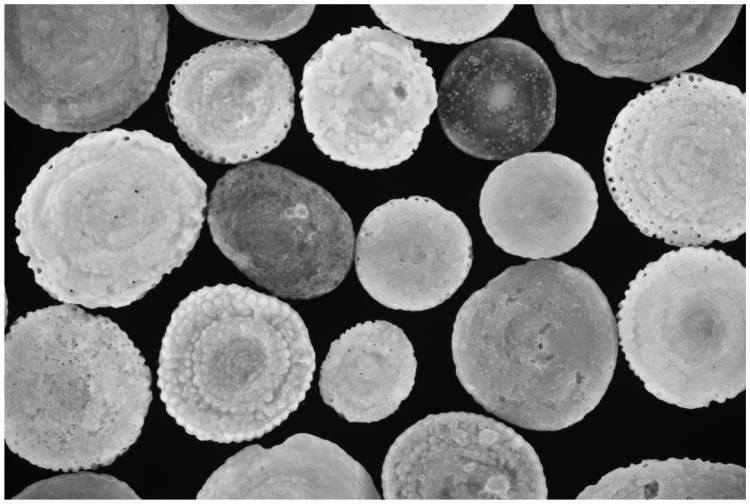
17 Foraminifera, known as 'forams', are small sea creatures with shells.

(a) When forams die they sink slowly through the seawater to form a layer at the bottom of the sea. The photograph shows a magnified view of some typical forams.



(Source: © alex7370/Shutterstock)

(i) A spherical foram with a mass of 1.15×10^{-8} kg is sinking at terminal velocity in seawater. The upthrust due to the seawater is 4.37×10^{-8} N. The flow of seawater around the sinking foram is laminar.

Show that the viscous drag on the foram is about 7×10^{-8} N.

(3)

(ii) Calculate the terminal velocity of this foram.

diameter of foram = 9.2×10^{-4} m
viscosity of seawater = 1.41×10^{-3} Pa s

(2)

Terminal velocity = ...

(b) As the forams sink deeper into the sea, the temperature of the water becomes lower.

Discuss how the terminal velocities of forams change as they sink deeper into the sea.

(4)

(Total for Question 17 = 9 marks)