

- 3** A scuba diver releases an air bubble, of diameter 3.0 cm from a depth of 14 m below the sea level. The air is assumed to behave like an ideal gas and the temperature of the water is constant at 25°C.

- (a) (i)** Explain how molecular movement of the gas molecules inside the air bubble causes pressure exerted by the gas.

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- (ii) Given that the pressure at a depth of 14 m below the surface is 2.4×10^5 Pa, and the density of water is 1000 kg m^{-3} .

Calculate the volume of the air bubble when it reaches the surface of the water.

$$\text{volume of air bubble} = \dots \text{m}^3 [2]$$

- (b) (i) State the *First Law of Thermodynamics*.

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- (ii) State and explain whether heat is added or removed from the air bubble as the bubble rises.

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- (c) State and explain how the pressure of the air bubble differs if the gas does not behave as an ideal gas.

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