2 **(a)** A lump of pure ice floats on pure water in a beaker, as shown in Fig. 2.1.

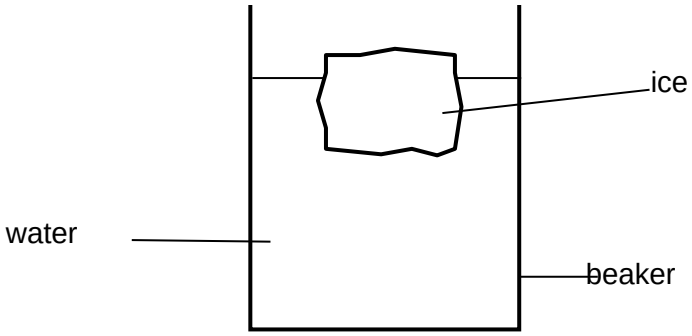

Fig. 2.1

(i) State, qualitatively, the relation between

1. the mass of the ice and the mass of the displaced water,

…… [1]

2. the density of ice and the density of water.

…… [1]

(ii) A student marks the level of water surface in the beaker and then observes the level as the ice melts. State and explain qualitatively the change, if any, in this level during the melting. Ignore the effects of evaporation.

…...……...……

…...……...……

…...……...……

…...……...……

…….. [3]

(b) A heavy anchor of volume 0.50 m^3 and density 7800 kg m^{-3} lies at the bottom of the seabed. A fisherman intends to use a lifting bag to raise the anchor from the seabed. Take the density of sea water to be 1030 kg m^{-3}.

(i) Explain what is meant by *upthrust*.

…...……...

…….. [1]

(ii) Determine the upthrust acting on the anchor.

upthrust = ……. N [2]

(iii) Determine the volume of air that needs to be released into the lifting bag suddenly in order that the initial acceleration of the anchor is 2.50 m s^{-2}.

volume of air = ……. m^3 [2]

[Total: 10]

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