

Answer on Question #53004-Physics-Mechanics-Kinematics-Dynamics

What pressure must be exerted on 20L of water at 20 °C to change its volume to 18.7L? The bulk modulus of elasticity of water at this temperature is $2.2 \times 10^9 \text{ Pa}$

Solution

The bulk modulus of elasticity is

$$E = -\frac{\Delta p}{\frac{\Delta V}{V}}$$

Thus,

$$\Delta p = -E \frac{\Delta V}{V} = 2.2 \cdot 10^9 \text{ Pa} \cdot \frac{20\text{L} - 18.7\text{L}}{20\text{L}} = 143 \cdot 10^6 \text{ Pa} = 143 \text{ MPa}.$$

Answer: 143 MPa.