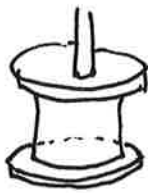


Atkins 33 (2)

The pressure difference across a cylindrical fluid surface?

I'll assume the fluid is confined between two fixed end-plates, and filled using a tube from one end.



$$A = 2\pi r h$$

$$dA = 2\pi h dr$$

(i) $dW = \gamma dA$ (where γ is the surface tension.)

(ii) $dW = p dV$ (the formula for work done by pressure p)

$$= p 2\pi r h dr \quad (\text{inserting } dV = 2\pi r h dr)$$

$$\gamma 2\pi h dr = p 2\pi r h dr \quad (\text{equating (i) \& (ii)})$$

$$\boxed{p = \frac{\gamma}{r}}$$