This is using the same methods and the calculations used in the 26A - Verifying newton's cooling law practical, but here we do this for water and another liquid with unknown specific heat capacity.

- Concept

> Here since we are using the same calorimeter and same volume of liquid for both the times, **the rate of loosing heat ($\frac{dH}{dt}$) will be the same for both**.

Using that relation we can find the unknown specific heat capacity.

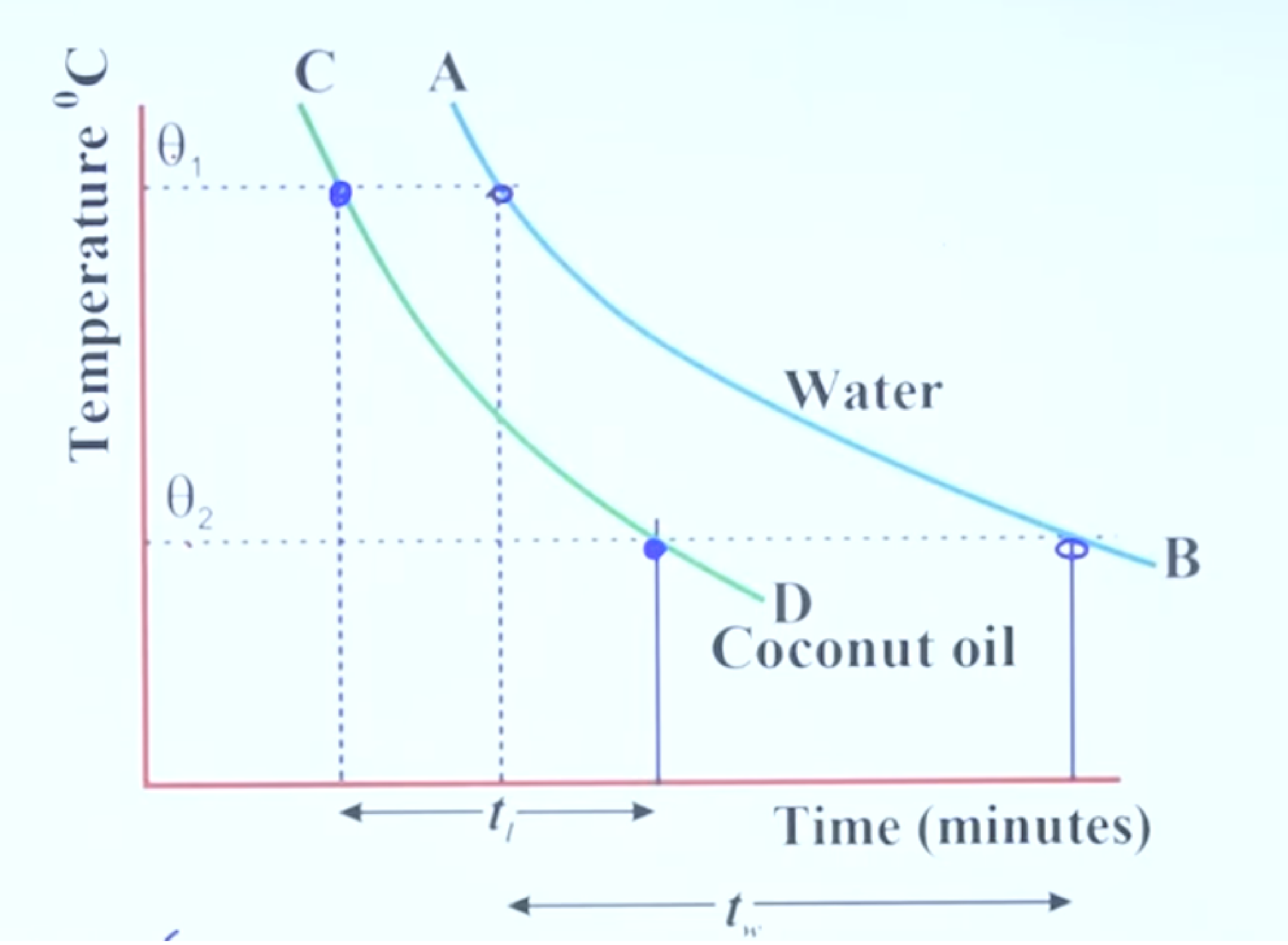
$$\frac{dH}{dt} = MS\frac{d\theta}{dt}$$

$$(M_cS_c + M_wS_w)\frac{d\theta}{dt}_w = (M_cS_c + M_lS_l)\frac{d\theta}{dt}_l$$
$$(M_cS_c + M_wS_w)\frac{\delta\theta}{t_w} = (M_cS_c + M_lS_l)\frac{\delta\theta}{t_l}$$

$$\therefore \frac{(M_cS_c + M_wS_w)}{t_w} = \frac{(M_cS_c + M_lS_l)}{t_l}$$

From this we can find S_l

> Here, t_w is for time it took for water go for $\delta\theta$ temperature difference
> Here, t_l is for time it took for the liquid go for $\delta\theta$ temperature difference



Important points

All the points in 26A - Verifying newton's cooling law are applied here

- Why do we have to use the same calorimeter for both the experiments?

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To make sure the same area of the calorimeter is used to cooling for both - same A
To make sure the cooling constant for both - same K
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$$\frac{dH}{dt} = KA(\theta_S - \theta_R)$$

- Why do we have to use the same volume of water inside the calorimeter?

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To make sure the same conditions are applied for both the times
To make sure the same surface area of the calorimeter is used for cooling conditions
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