№9. Escaping powder

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Conditions

- When a hot wire is plunged into a beaker of water with powder (e.g. lycopodium) floating on the surface, the powder moves rapidly. Investigate the parameters that alter the speed of movement of the powder.
Plan

1. Consider the phenomenon
2. Consider the reasons of the movement of the powder
3. Determine the effectiveness of each reason
4. Make experiments with each of the parameters and get the results of research
5. Analyze results, and make conclusion
Phenomenon
Unit
Reasons

- Convection currents
- Surface tension
- Steam
Convection currents
Convection currents
Surface tension
\[ F = \sigma l \]
Maximal temperature of water surface

\[ t_{\text{max}} \approx 50^\circ C \]
Dropping heated water

\[ a_i = 2mm / s^2 \]

Temperature of heated water is 100°C
Steam

Steam blows the sticks
$a_{i1} = 2\text{mm} / s^2$ \hspace{1cm} $a_{i2} = 12\text{mm} / s^2$
Dependence acceleration on diameter of wire.
Wire submerging speed

\[ a_{\text{slow}} = 19 \text{mm} / \text{s}^2 \]

- 3 s

\[ a_{\text{fast}} = 23 \text{mm} / \text{s}^2 \]

- 0.5 s

Diameter of wire is 16 mm

Temperature of water 20 °C
Conclusion

- The main reason of movement is the steam jet
- Acceleration rises while the depth of wire submerging increases
- If the diameter of wire increases the velocity of the sticks rises linear
- Acceleration increases while the speed of wire submerging rises