# Saving jack:a cool investigation (THM)

Physics Portfolio By Clement Ng 12.6

Aim: Investigating whether the effect of clothing would have any affect on Jack's hypothermia state and his tragic death at the end of the movie "Titanic".
Description: Water at 5°C is used to model the sea water Jack is submerged in. Furthermore, a test tube with 15ml of 40°C water is used to act as the body of Jack. The test tube is wrapped with varying layers of clothing and submerged in the modeled sea water. A probe is connected to both the test tube and a data logger hence the temperature change of the test tube with 15ml of 40°C water is measured. The volume/temperature of the sea water is kept constant. Furthermore, the level test tube is submerged at is also kept constant. All used equipment would be kept constant throughout the whole experiment, except for the use of the test tubes, because after submerged its own temperature might decrease and affect the newly measured 15ml of 40°C of water.

*Control Experiment:*
Qua*ntitative* data*:*
Layers *of* c*lothing:* 3
Su*rrounding room temper*ature*:* 24.5 °C
15ml of 40°C of water acting as body temperature

| Time (min)(±2s) | Temperature (°C)(±0.5°C) |
|---|---|
| 0 | 35.0 |
| 1 | 33.7 |
| 2 | 33.1 |
| 3 | 32.5 |
| 4 | 31.3 |
| 5 | 31.0 |
| 6 | 30.8 |
| 7 | 30.1 |
| 8 | 29.9 |
| 9 | 29.4 |
| 10 | 29.2 |
| 11 | 28.9 |
| 12 | 28.7 |
| 13 | 28.4 |
| 14 | 28.2 |
| 15 | 28.4 |
| 16 | 28.0 |
| 17 | 27.6 |
| 18 | 27.6 |
| 19 | 27.7 |
| 20 | 27.4 |
| 21 | 27.1 |

Qualitative data: Even though tightly wrapped with 3 layers of clothing, and only affected by the surrounding room temperature, the temperature readings on the data logger continued to decrease until it was about the same level with the environment.

*S*ubmerged Experiment:
Quantitative data:
*S*ubmerged water temperature: 5°C
*S*ubmerged amount of test tube: 8cm
*S*urrounding room temperature: 24.5 °C
15ml of 40°C of water acting as body temperature

| Amount of Layers of clothing | Time (min)(±2s) | Temperature (°C)(±0.7°C) |
|---|---|---|
| 3 | 0 | 38.0 |
| | 1 | 17.5 |
| | 2 | 13.3 |
| | 3 | 11.1 |
| | 4 | 9.8 |

| | | |
|---|---|---|
| | 5 | 8.0 |
| 6 | 0 | 38.0 |
| | 1 | 14.7 |
| Amount of Layers of clothing | Time (min)(±2s) | Temperature (°C)(±0.7°C) |
| 6(continued) | 2 | 12.1 |
| | 3 | 10.4 |
| | 4 | 9.0 |
| | 5 | 8.5 |
| 9 | 0 | 38.0 |
| | 1 | 20.7 |
| | 2 | 16.3 |
| | 3 | 13.4 |
| | 4 | 12.2 |
| | 5 | 10.6 |
| 12 | 0 | 38.0 |
| | 1 | 19.7 |
| | 2 | 14.3 |
| | 3 | 12.8 |
| | 4 | 11.3 |
| | 5 | 10.4 |
| 15 | 0 | 38.0 |
| | 1 | 22.9 |
| | 2 | 17.3 |
| | 3 | 14.6 |
| | 4 | 13.1 |
| | 5 | 11.9 |
| 18 | 0 | 38.0 |
| | 1 | 22.8 |
| | 2 | 17.9 |
| | 3 | 15.6 |
| | 4 | 13.6 |
| | 5 | 12.7 |
| 21 | 0 | 38.0 |
| | 1 | 23.6 |
| | 2 | 18.7 |
| | 3 | 16.9 |
| | 4 | 15.3 |
| | 5 | 14.3 |

Qualitative data: Similar with the control experiment, the temperature readings on the data logger decreased. However this time the decrease was much more rapid, and temperature readings on logger tend to vary and jump about 0.5 °C. In addition to this, when removing test tube after experiment it was observed that many of the modeled sea water was absorbed by the clothing, therefore we had to replace the water and ensure that it remains back at a constant temperature of 5 °C.

| | Amount of Layers of Clothing | Time (seconds) | | | Temperature (°C) | | |
|---|---|---|---|---|---|---|---|
| | | Minimum | Normal | Maximum | Minimum | Normal | Maximum |
| Control Experiment | 3 | 58 | 60 | 62 | 33.0 | 33.7 | 34.4 |
| | | 118 | 120 | 122 | 32.4 | 33.1 | 33.8 |
| | | 178 | 180 | 182 | 31.8 | 32.5 | 33.2 |
| | | 238 | 240 | 242 | 30.6 | 31.3 | 32 |
| | | 298 | 300 | 302 | 30.3 | 31.0 | 31.7 |
| | | 358 | 360 | 262 | 30.1 | 30.8 | 31.5 |
| | | 418 | 420 | 422 | 29.4 | 30.1 | 30.8 |
| | | 478 | 480 | 482 | 29.2 | 29.9 | 30.6 |
| | | 538 | 540 | 542 | 28.7 | 29.4 | 30.1 |
| | | 598 | 600 | 602 | 28.5 | 29.2 | 29.9 |
| | | 658 | 660 | 662 | 28.2 | 28.9 | 29.6 |
| | | 718 | 720 | 722 | 28.0 | 28.7 | 29.4 |
| | | 778 | 780 | 782 | 27.7 | 28.4 | 29.1 |
| | | 838 | 840 | 842 | 27.5 | 28.2 | 28.9 |
| | | 898 | 900 | 902 | 27.7 | 28.4 | 29.1 |
| | | 958 | 960 | 962 | 27.3 | 28.0 | 28.7 |
| | | 1018 | 1020 | 1022 | 26.9 | 27.6 | 28.3 |
| | | 1078 | 1080 | 1082 | 26.9 | 27.6 | 28.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1138 | 1140 | 1142 | 27.0 | 27.7 | 28.4 |
| | | 1198 | 1200 | 1202 | 26.7 | 27.4 | 28.1 |
| | | 1258 | 1260 | 1262 | 26.4 | 27.1 | 27.8 |
| | Amount of Layers of Clothing | Time (seconds) | | | Temperature (°C) | | |
| Submerged Experiment | | Minimum | Normal | Maximum | Minimum | Normal | Maximum |
| | 3 | 58 | 60 | 62 | 16.8 | 17.5 | 18.2 |
| | | 118 | 120 | 122 | 12.6 | 13.3 | 14.0 |
| | | 178 | 180 | 182 | 10.4 | 11.1 | 11.8 |
| | | 238 | 240 | 242 | 9.1 | 9.8 | 10.5 |
| | | 298 | 300 | 302 | 7.3 | 8.0 | 8.7 |
| | 6 | 58 | 60 | 62 | 14.0 | 14.7 | 15.4 |
| | | 118 | 120 | 122 | 11.4 | 12.1 | 12.8 |
| | | 178 | 180 | 182 | 9.7 | 10.4 | 11.1 |
| | | 238 | 240 | 242 | 8.3 | 9.0 | 9.7 |
| | | 298 | 300 | 302 | 7.8 | 8.5 | 9.2 |
| | 9 | 58 | 60 | 62 | 20.0 | 20.7 | 21.4 |
| | | 118 | 120 | 122 | 15.6 | 16.3 | 17.0 |
| | | 178 | 180 | 182 | 12.7 | 13.4 | 14.1 |
| | | 238 | 240 | 242 | 11.5 | 12.2 | 12.9 |
| | | 298 | 300 | 302 | 9.9 | 10.6 | 11.3 |
| | 12 | 58 | 60 | 62 | 19.0 | 19.7 | 20.4 |
| | | 118 | 120 | 122 | 13.6 | 14.3 | 15.0 |
| | | 178 | 180 | 182 | 12.1 | 12.8 | 13.5 |
| | | 238 | 240 | 242 | 10.6 | 11.3 | 12.0 |
| | | 298 | 300 | 302 | 9.7 | 10.4 | 11.1 |
| | 15 | 58 | 60 | 62 | 22.2 | 22.9 | 23.6 |
| | | 118 | 120 | 122 | 16.6 | 17.3 | 18.0 |
| | | 178 | 180 | 182 | 13.9 | 14.6 | 15.3 |
| | | 238 | 240 | 242 | 12.4 | 13.1 | 13.8 |
| | | 298 | 300 | 302 | 11.2 | 11.9 | 12.6 |
| | 18 | 58 | 60 | 62 | 22.1 | 22.8 | 23.5 |
| | | 118 | 120 | 122 | 17.2 | 17.9 | 18.6 |
| | | 178 | 180 | 182 | 14.9 | 15.6 | 16.3 |
| | | 238 | 240 | 242 | 12.9 | 13.6 | 14.3 |
| | | 298 | 300 | 302 | 12.0 | 12.7 | 13.4 |
| | 21 | 58 | 60 | 62 | 22.9 | 23.6 | 24.3 |
| | | 118 | 120 | 122 | 18.0 | 18.7 | 19.4 |
| | | 178 | 180 | 182 | 16.2 | 16.9 | 17.6 |
| | | 238 | 240 | 242 | 14.6 | 15.3 | 16.0 |
| | | 298 | 300 | 302 | 13.6 | 14.3 | 15.0 |

By Clement Ng 12.6 Thursday, April 4 2002 12:39AM