

测量结果

1. T_1

t (min)	1	2	3	4	5	6
T_1 ($^{\circ}\text{C}$)	23.39	23.41	23.44	23.46	23.50	23.54

2. ΔT

t (s)	10	20	30	40	50	60
ΔT ($^{\circ}\text{C}$)	24.91	26.95	27.88	28.44	28.86	28.98

3. T_2

t (min)	8	9	10	11	12
T_2 ($^{\circ}\text{C}$)	28.98	28.95	28.89	28.89	28.88

4. 其他相关数据

环境条件:

$T' = 99.85^{\circ}\text{C}$ (测得当地大气压为 1007.4 hpa) 室温: $T = 26.82^{\circ}\text{C}$

质量和体积:

$m_{\text{Zn}} = 220\text{ g}$ $m_{\text{Cu}} = 155.32\text{ g}$ $m_{\text{H}_2\text{O}} = 225.58\text{ g}$ $V = 0.25\text{ cm}^3$

比热容:

$C_{\text{Cu}} = 0.389\text{ J}/(\text{g}\cdot\text{K})$ $C_{\text{H}_2\text{O}} = 4.2\text{ J}/(\text{g}\cdot\text{K})$

T-t 图像

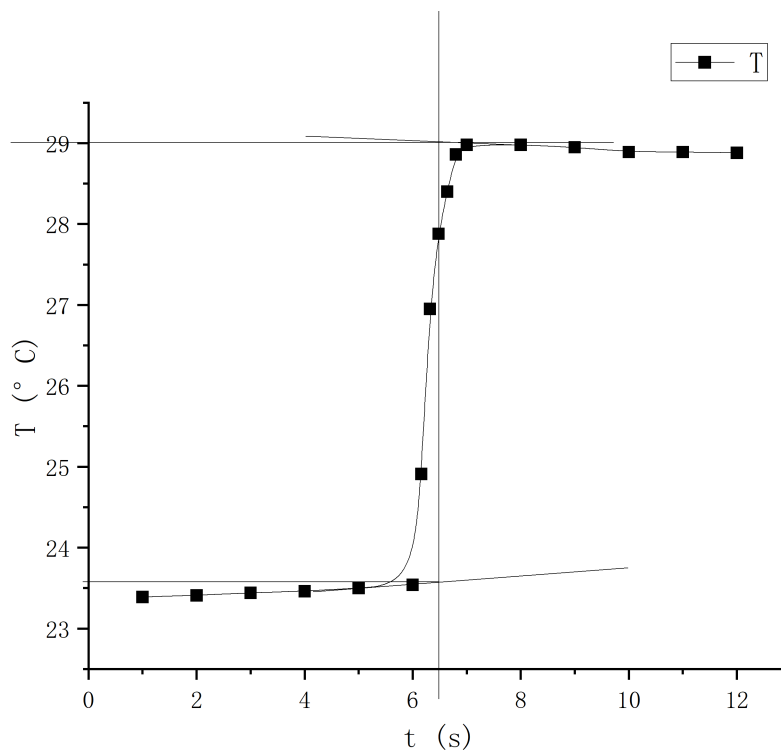


图 1: 温度-时间图像

比热容计算

由图像得理想条件下:

$$T_1 = 23.6^\circ\text{C} \quad T_2 = 29.1^\circ\text{C}$$

由此可得:

$$\begin{aligned} C_{\text{Zn}} &= \frac{(m_{\text{Cu}}C_{\text{Cu}} + m_{\text{H}_2\text{O}}C_{\text{H}_2\text{O}} + 2.0 \times V)(T_2 - T_1)}{m_{\text{Zn}}(T' - T_2)} \\ &= \frac{(155.32 \times 0.389 + 225.58 \times 4.2 + 2.0 \times 0.25) \times (29.1 - 23.6)}{220 \times (99.85 - 29.1)} \\ &= 0.356 \text{ J}/(\text{g} \cdot \text{K}) \end{aligned}$$

与标准值 $C_{\text{Zn}} = 0.386 \text{ J}/(\text{g} \cdot \text{K})$ 相比得相对误差为:

$$\sigma = \frac{\Delta C_{\text{Zn}}}{C_{\text{Zn}}} = \frac{0.03}{0.386} = 0.0778 = 7.78\%$$