

Answer on Question #47745-Physics-Other

The temperature of 0.2 kg of paraffin oil in a vacuum flask 1 degree celsius per minute with an immersion heater of 12.3 watts. In repeating with 0.4 kg of oil, the temperature rises by 1.2 degree celsius per minute for an input of 19.2 watts. Find the specific heat capacity of oil and thermal capacity of flask.

Solution

$$Pt = [mS + \omega]\theta$$

$$12.3 \cdot 60 = [0.2S + \omega]1$$

$$19.2 \cdot 60 = [0.4S + \omega]1.20$$

Now,

$$0.2S + \omega = 738$$

$$0.4S + \omega = 960$$

Subtracting, $0.2S = 222$ or $S = 1110 \text{ J kg}^{-1}\text{°C}^{-1}$

$$\omega = (738 - 0.2 \cdot 1110) \text{ J K}^{-1} = 516 \text{ J K}^{-1}.$$