

14 The photograph shows a filament bulb.

The filament is an emitter with 35% of the power output of a black body radiator of the same temperature.

- (a) When a potential difference (p.d) of 2.0 V is applied across the bulb, there is a current of 0.37 A in the filament.

Calculate the temperature of the filament.

surface area of filament = $3.9 \times 10^{-6} \text{ m}^2$

(3)

Temperature =

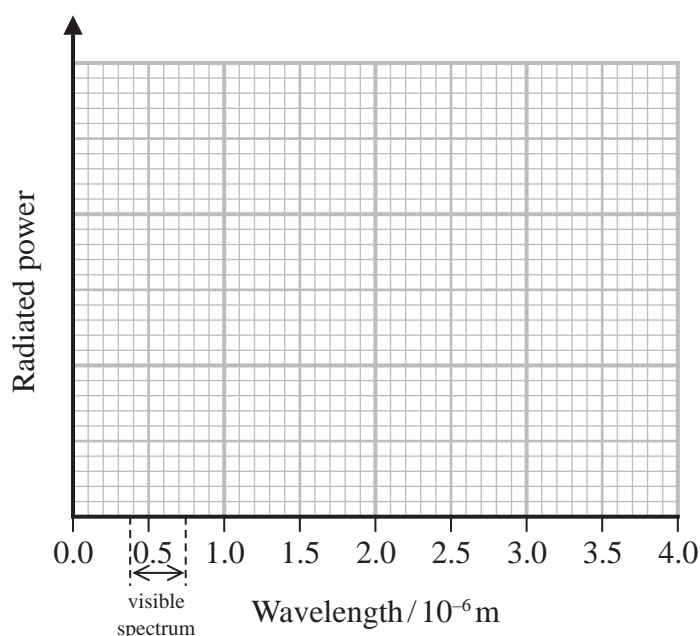
- (b) In an experiment to investigate the efficiency of a filament light bulb a p.d. was applied. The p.d. and current were measured and the light bulb was observed. The p.d. was then increased and new measurements taken.

When a small p.d. is applied to the bulb, no light is visible. If the p.d. is gradually increased, the filament starts to glow and eventually appears white.

- (i) Add to the graph to show the distribution of radiation from a black body at a temperature of 2026 K.

Your answer should include a calculation.

(5)



- (ii) Use your graph to explain why filament light bulbs are considered inefficient.

(2)