Blackbody Radiation

Apparatus

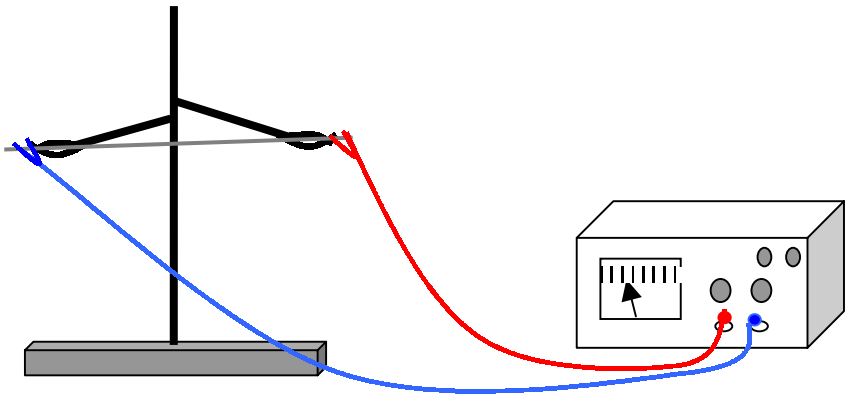
graphite rods from refillable pencils, variable power supply, stand with clips to hold the rods
A rod is held by insulated clamps on the stand and the terminals of the power supply connected to each end.

Action

The students vary the voltage across the rod and see what happens. They should do this slowly. The rod will begin to glow and may eventually burn out. The power supply should be turned off and reset to minimum power before another rod is connected (if you have many groups or multiple tutorials).
If you have small hand held spectroscopes the students can observe the rod through the spectroscope and try to estimate the wavelength of maximum intensity (although this is difficult).

The Physics

As you turn up the power supply the voltage across the graphite gets greater. This gives a bigger current through the graphite, and more power dissipated in it, hence it gets hotter. As it gets hot it begins to glow. Initially it glows red, and as it heats up more it glows orange and yellowish. If you could get it hot enough without melting it, it would glow white hot and eventually blue and ultraviolet. The rod is behaving like a black body and obeying Wein's law, which says that the intensity of radiation increases and the wavelength of peak intensity decreases as the object gets hotter.



Accompanying sheet

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Gradually turn up the power passing through the graphite.

What happens as you increase the power?

Explain your observations.