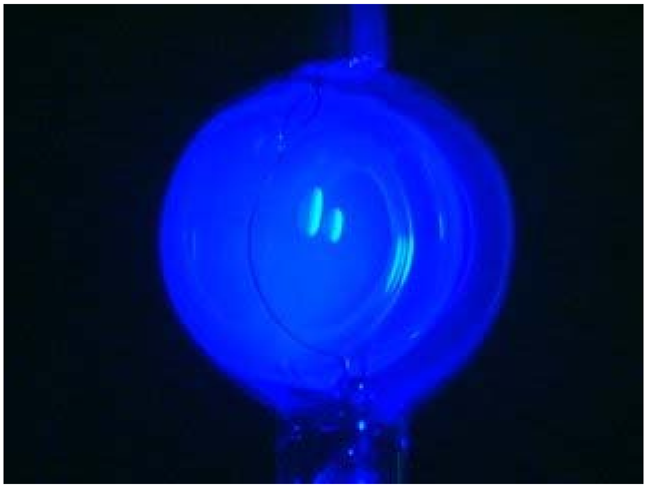
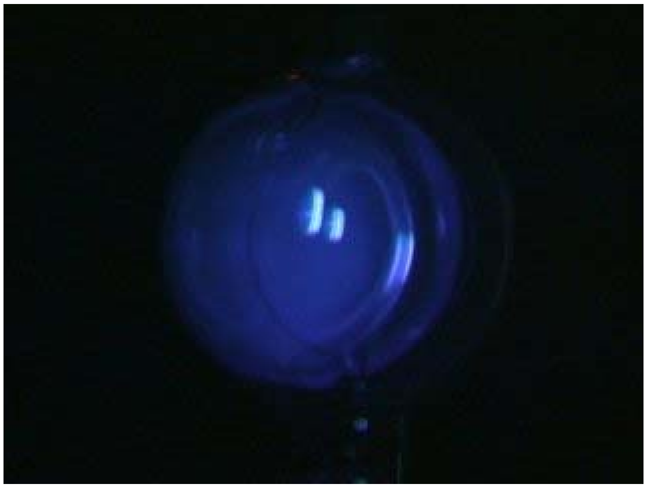
Answer #250

Part (1): The answer is (a): the stopping voltage will be greater, as seen in an mpeg video by clicking your mouse on the photograph at the right below.

Part (2) The answer is (b): the stopping voltage will be less, as seen in an mpeg video by clicking your mouse on the photograph at the left below.

The stopping voltage for the blue light is seen by clicking your mouse on the photograph in the center below.





A higher photon energy results in a greater kinetic energy for the electron as it leaves the emissive surface. Therefore, it requires a higher voltage to stop the electrons and cause the current to cease, as seen in the videos.

You can use the equation:

$$E = hf - W$$

whre E is the exiting electron kinetic energy, hf is the incoming photon energy, and W is the work function of the photoemitting metal (not known), and the data from this demonstration to make a rough determination of Planck's constant (about 20% low when I do it). Here are the necessary data:

- charge on the electron: 1.60×10^{-19} C
- frequency of the green light: 5.5×10^{14} Hz
- stopping voltage for green light: 0.54 V
- frequency of the blue light: 6.9×10^{14} Hz
- stopping voltage for blue light: 0.94 V
- frequency of the violet light: 7.4×10^{14} Hz
- stopping voltage for violet light: 1.16 V

Teeny, isn't it?

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Question of the Week

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.