1. The threshold frequency in a photoelectric experiment is most closely related to the

   A) brightness of the incident light
   B) thickness of the photoemissive metal
   C) area of the photoemissive metal
   D) work function of the photoemissive metal

2. When a source of dim orange light shines on a photosensitive metal, no photoelectrons are ejected from its surface. What could be done to increase the likelihood of producing photoelectrons?

   A) Replace the orange light source with a red light source.
   B) Replace the orange light source with a higher frequency light source.
   C) Increase the brightness of the orange light source.
   D) Increase the angle at which the photons of orange light strike the metal.

3. A metal surface emits photoelectrons when illuminated by green light. This surface must also emit photoelectrons when illuminated by

   A) blue light B) yellow light
   C) orange light D) red light

4. In the photoelectric effect, the speed of emitted electrons may be increased by

   A) increasing the frequency of the light
   B) decreasing the frequency of the light
   C) increasing the intensity of illumination
   D) decreasing the intensity of illumination

5. The threshold frequency for a photoemissive surface is 6.4×10^{14} hertz. Which color light, if incident upon the surface, may produce photoelectrons?

   A) blue B) green
   C) yellow D) red

6. The threshold frequency of a metal surface is in the violet light region. What type of radiation will cause photoelectrons to be emitted from the metal's surface?

   A) infrared light B) red light
   C) ultraviolet light D) radio waves

7. Photons with an energy of 7.9 electron-volts strike a zinc plate, causing the emission of photoelectrons with a maximum kinetic energy of 4.0 electronvolts. The work function of the zinc plate is

   A) 11.9 eV B) 7.9 eV
   C) 3.9 eV D) 4.0 eV

8. Photons with a frequency of 1.0×10^{20} hertz strike a metal surface. If electrons with a maximum kinetic energy of 3.0×10^{-14} joule are emitted, the work function of the metal is

   A) 1.0×10^{-14} J B) 2.2×10^{-14} J
   C) 3.6×10^{-14} J D) 6.6×10^{-14} J

9. The threshold frequency for a photoemissive surface is 1.0×10^{14} hertz. What is the work function of the surface?

   A) 1.0×10^{-14} J B) 6.6×10^{-20} J
   C) 6.6×10^{-48} J D) 2.2×10^{-28} J

10. The threshold frequency for a photoemissive surface is 4.0×10^{14} hertz. What is the work function of this surface?

    A) 1.2×10^{-19} J B) 2.6×10^{-19} J
    C) 6.0×10^{14} J D) 6.1×10^{47} J

11. The threshold frequency for a certain photoelectric surface is 6.5×10^{14} hertz. The work function of the surface is

    A) 1.2×10^{-48} J B) 4.3×10^{-19} J
    C) 7.5×10^{-18} J D) 9.8×10^{47} J

12. The work function of a photoelectric material can be found by determining the minimum frequency of light that will cause electron emission and then

    A) adding it to the velocity of light
    B) multiplying it by the velocity of light
    C) adding it to Planck's constant
    D) multiplying it by Planck's constant

13. Which determines the number of electrons emitted by a photoelectric material?

    A) intensity B) color
    C) frequency D) wavelength

14. When photons with an energy of 3.0 electron-volts strike a photoelectric surface the maximum kinetic energy of the emitted photoelectrons is 2.0 electron volts. What is the work function of the surface?

A) 1.0 eV B) 0.67 eV
C) 1.5 eV D) 5.0 eV

15. The maximum kinetic energy of an electron ejected from a metal by a photon depends on

A) the photon's frequency, only
B) the metal's work function, only
C) both the photon's frequency and the metal's work function
D) neither the photon's frequency nor the metal's work function

16. A 5-eV photon is incident on a metal that has a work function of 3 eV. The energy of the emitted photoelectron is

A) 8 eV B) 2 eV C) 3 eV D) 15 eV

17. The work function for a copper surface is 7.3×10^{-19} joule. If photons with an energy of 9.9×10^{-19} joule are incident on the copper surface, the maximum kinetic energy of the ejected photoelectrons is

A) 2.6×10^{-19} J B) 7.3×10^{-19} J
C) 9.9×10^{-19} J D) 1.7×10^{30} J

18. When 8.0-electronvolt photons strike a photoemissive surface, the maximum kinetic energy of ejected photoelectrons is 6.0 electronvolts. The work function of the photoemissive surface is

A) 0.0 eV B) 2.0 eV
C) 7.0 eV D) 14.0 eV

19. The work function of a certain photoemissive material is 2.0 electronvolts. If 5.0-electronvolt photons are incident on the material, the maximum kinetic energy of the ejected photoelectrons will be

A) 7.0 eV B) 5.0 eV
C) 3.0 eV D) 2.5 eV

20. Photons with energies of 3.9×10^{-19} joule strike a photoemissive surface whose work function is 2.9×10^{-19} joule. The maximum kinetic energy of the ejected photoelectrons is

A) 1.0×10^{-19} J B) 7.5×10^{-20} J
C) 7.0×10^{-19} J D) 1.2×10^{-18} J

21. The work function of a metal is 4.2 eV. If photons with an energy of 5.0 eV strike the metal, the maximum kinetic energy of the emitted photoelectrons will be

A) 0 eV B) 0.80 eV
C) 3.8 eV D) 9.2 eV

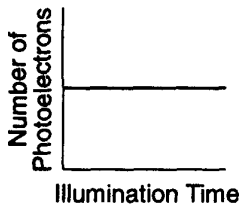
22. As the frequency of photons incident upon a photoemissive surface is increased, the maximum energy of the photoelectrons

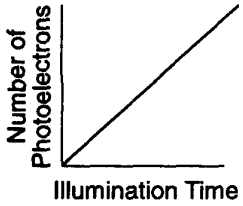
A) decreases B) increases
C) remains the same

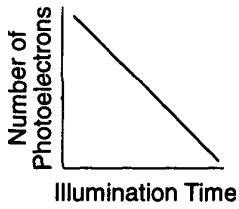
23. A certain photoemissive material with a work function of 1.3×10^{-19} joule is exposed to incident photons with an energy of 3.3×10^{-19} joule. The maximum kinetic energy that an ejected photoelectron can attain is closest to

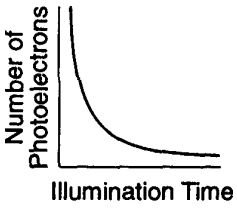
A) 1.0×10^{-39} J B) 2.0×10^{-19} J
C) 3.0×10^{-19} J D) 4.0×10^{-19} J

24. A beam of monochromatic light incident on a metal surface causes the emission of photoelectrons. The length of time that the surface is illuminated by this beam is varied, but the intensity of the beam is kept constant. Which graph best represents the relationship between the total number of photoelectrons emitted and the length of time of illumination?

A)


B)


C)


D)


25. When yellow light shines on a photosensitive metal, photoelectrons are emitted. As the intensity of the light is decreased, the number of photoelectrons emitted per second

A) decreases B) increases
C) remains the same

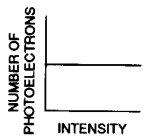
26. A beam of blue light causes photoelectrons to be emitted from a photoemissive surface. An increase in the intensity of the blue light will cause an increase in the

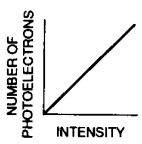
A) maximum kinetic energy of the emitted photoelectrons
B) number of photoelectrons emitted per unit of time
C) charge carried by each photoelectron
D) work function of the photoemissive surface

27. The threshold frequency of a photoemissive surface is 7.1×10^{14} hertz. Which electromagnetic radiation, incident upon the surface, will produce the greatest amount of current?

A) low-intensity infrared radiation
B) high-intensity infrared radiation
C) low-intensity ultraviolet radiation
D) high-intensity ultraviolet radiation

28. Which graph best represents the relationship between the intensity of light that falls on a photoemissive surface and the number of photoelectrons that the surface emits?

A) 

B) 

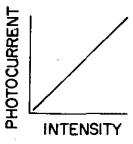
C) 

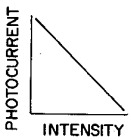
D) 

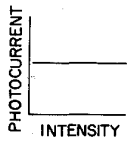
29. Electromagnetic radiation of constant frequency incident on a photoemissive material causes the emission of photoelectrons. If the intensity of this radiation is increased, the rate of emission of photoelectrons will

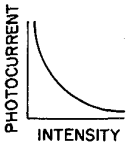
A) decrease
B) increase
C) remain the same

30. Which graph best represents the relationship between the photocurrent in a photoelectric cell and the intensity of the incident light?

A) 

B) 

C) 

D) 

Base your answers to questions **31** through **33** on the information below.

Light of constant intensity strikes a metal surface. The frequency of the light is increased from 6.0×10^{14} cycles per second to 9.0×10^{14} cycles per second. Photoelectrons are emitted by the metal surface when the frequency reaches 8.0×10^{14} cycles per second.

31. As the frequency of the incident light increases, the photons striking the metal surface increase in

A) number
B) energy
C) speed
D) wavelength

32. The work function of the metal surface is approximately

A) 6.0×10^{-19} J
B) 2.0×10^{-19} J
C) 5.3×10^{-19} J
D) 4.0×10^{-19} J

33. If the intensity of the incident light were increased while the frequency was kept constant, the maximum kinetic energy of the emitted photoelectrons would

A) decrease
B) increase
C) remain the same

---

34. Which occurs when the intensity of monochromatic light striking a photoemissive material increases?

A) The number of electrons emitted increases.
B) The number of electrons emitted decreases.
C) The energy of the emitted electrons increases.
D) The energy of the emitted electrons decreases.

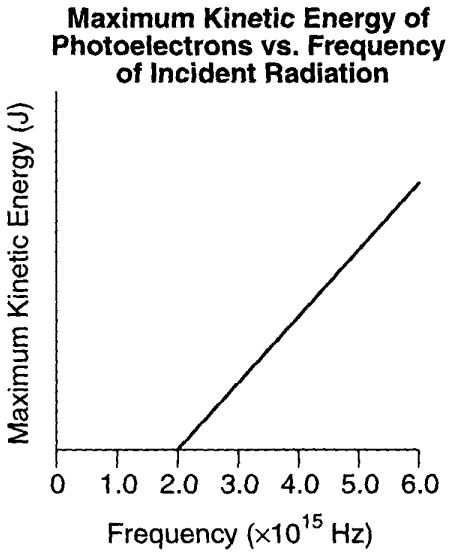
35. As the intensity of monochromatic light on a photoemissive surface increases, the maximum kinetic energy or the photoelectrons emitted

A) decreases
B) increases
C) remains the same

36. The slope of a graph of photon energy versus photon frequency represents

A) Planck's constant
B) the mass of a photon
C) the speed of light
D) the speed of light squared

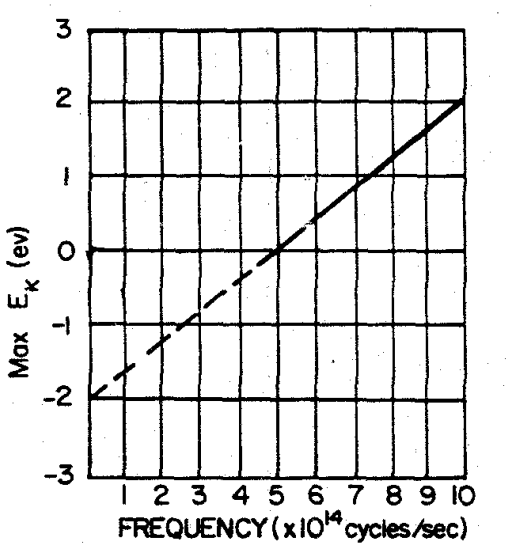
37. The graph below shows the maximum kinetic energy of photelectrons ejected from a metal as a function of frequency of incident electromagnetic radiation



What is the work function of the metal?

A) 6.6×10^{-34} J
B) 1.3×10^{-18} J
C) 2.0×10^{15} J
D) 3.0×10^{48} J

Base your answers to questions **38** through **41** on the graph below which represents the relationship between the maximum kinetic energy of emitted photoelectrons and the frequencies of the photons incident upon a photoemissive surface.



38. The photoemissive surface is replaced with a surface having a smaller work function. Compared to the threshold frequency of the original photoemissive surface, the threshold frequency of the new photoemissive surface is

A) less
B) greater
C) the same

39. A photon whose frequency is equal to the threshold frequency strikes the photoemissive surface. What is the maximum kinetic energy of the emitted photoelectron?

A) 5.0 eV
B) 2.0 eV
C) –2.0 eV
D) 0 eV

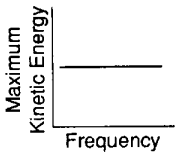
40. The work function of the photoemissive surface is approximately

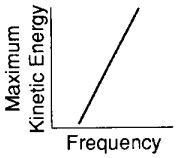
A) 0 eV
B) 2.0 eV
C) 1.5 eV
D) 4.0 eV

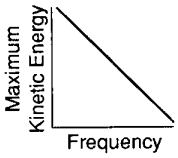
41. What is the frequency in cycles per second of a photon that would result in the emission of a photoelectron with a maximum kinetic energy of 2.0 eV?

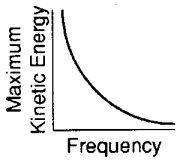
A) 0 Hz
B) 2.0×10^{14} Hz
C) 1.5×10^{14} Hz
D) 10.0×10^{14} Hz

42. Which graph below best represents the relationship between the frequency of a light source causing photoemission and the maximum kinetic energy of the photoelectrons produced?

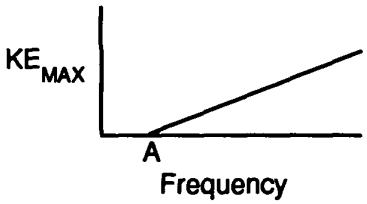
A) 

B) 

C) 

D) 

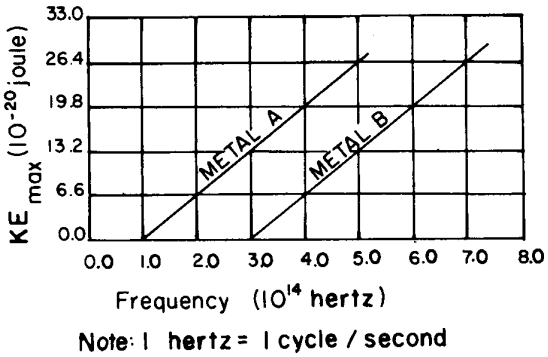
43. The graph below shows the relationship between the frequency of radiation incident on a photosensitive surface and the maximum kinetic energy (KE_{max}) of the emitted photoelectrons.



The point labeled *A* on the graph represents the

A) incident photon intensity
B) photoelectron frequency
C) threshold frequency
D) work function energy

Base your answers to questions **44** through **48** on the graph below which represents the maximum kinetic energy of photoelectrons as a function of incident electromagnetic frequencies for two different photoemissive metals, *A* and *B*.



44. Monochromatic light with a period of 2.0×10^{-15} second is incident on both of the metals. Compared to the energy of the photoelectrons emitted by metal *A*, the energy of the photoelectrons emitted by metal *B* is

A) less
B) greater
C) the same

45. Compared to the work function for metal *B*, the work function for metal *A* is

A) less
B) greater
C) the same

46. The work function for metal *B* is closest to

A) 0.0 J
B) 2.0×10^{-19} J
C) 2.0×10^{-3} J
D) 1.5×10^{-4} J

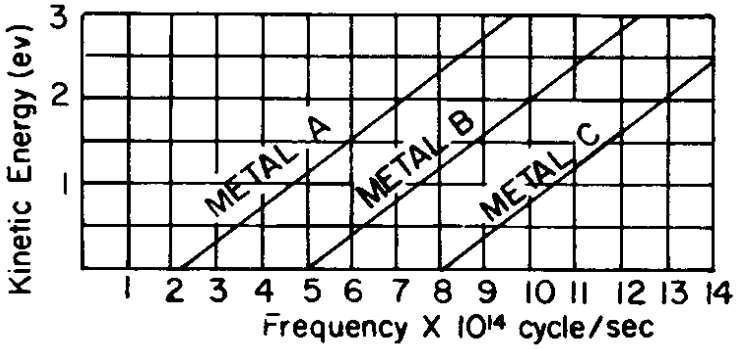
47. The threshold frequency for metal *A* is

A) 1.0×10^{14} Hz
B) 2.0×10^{14} Hz
C) 3.0×10^{14} Hz
D) 0.0 Hz

48. The slope of each line is known as

A) Bohr's constant
B) the photoelectric constant
C) Compton's constant
D) Planck's constant

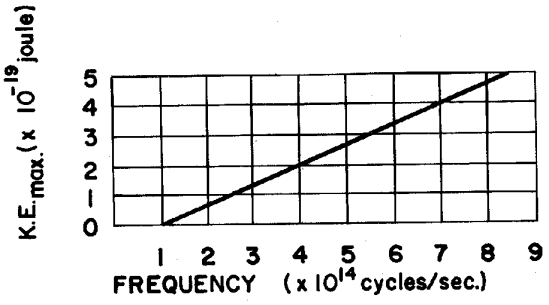
49. Base your answer to the following question on the graph below which represents the maximum kinetic energy of photoelectrons for varying frequencies for three different metals.



The slope of each graph represents

A) the work function
B) Planck's constant
C) the threshold frequency
D) the kinetic energy

50. Base your answer to the following question on the graph below which shows the maximum kinetic energy of the photoelectrons ejected when photons of different frequencies strike a metal surface.



Compared to the energy of the bombarding photon, the energy of the emitted photoelectron is

A) less
B) greater
C) the same