

1. Formulate the Kirchhoff relationship between the emissivity and the absorptive capacity. Emissivity function for perfect black body.
2. Estimate the emissivity for a perfect mirror (reflects all incident electromagnetic energy).
3. Specify the units of measurement for emissivity and absorption capacity.
4. How much energy (in Joules) does the human body radiate in 1 second? (body area 2 m^2 , temperature 36.6°C)
5. In what region of the electromagnetic spectrum the maximum emissivity of the human body is located (temperature 36.6 C)?
6. Monochromatic light source emits 10 Watts of electromagnetic energy. How many photons does this source emit in one second if the wavelength of the electromagnetic wave is 5000 \AA ?
7. Monochromatic light source emits 1 Watt of electromagnetic energy. Estimate the mass loss of the source in one second due to the emission of photons, if the wavelength of the electromagnetic wave is 400 nm ?
8. The basic regularities of photo effect (With your comments).
9. The photoelectric effect is associated with the interaction of photons with electrons located on the surface of a metal (scattering of photons by an electron is similar to the Compton effect). But why does the energy of the emitted electrons not depend on the direction in which the photon hits the electron (unlike the photoelectric effect)?
10. Give a qualitative description of the Compton effect.
11. Calculate the **kinetic mass** and momentum for a photon with an wavelength of 5000 \AA .
12. At what frequency of the photon its energy equal to the rest energy of electron?
13. Calculate the kinetic part (associated with motion) of the total kinetic energy of an electron moving at a speed of 0.9 light speed.
14. What do the expressions for calculating the kinetic energy of an electron look like in the special theory of relativity and in classical mechanics?
15. Why is a hydrogen atom unstable from the point of view of classical physics?
16. Formulate Bohr's postulates for the hydrogen atom. Which postulate has no physical justification? Why?
17. The physical meaning of the Heisenberg uncertainty principle. Is this relationship somehow related to the limitations of the accuracy of physical measurements?