**Situational tasks on the topic with answer standards.**

1. X-ray quanta with an energy of 4.9 eV tear electrons out of matter with an output work of 4.6 eV. What additional energy will the electrons get? What is the observed phenomenon?

Answer: Ek=0.3 eV, photo effect

2. X-ray quanta with an energy of 0.6 MeV tear electrons out of matter with an output work of 5 eV. Find the kinetic energy of the electrons, if the secondary quantum was 0.4 MeV.

Answer: Ek=0.2 MeV

3. The voltage applied to the anode in the X-ray tube was increased from 100 kV to 200 kV. What will happen to the boundary wavelength of the Bremsstrahlung X-ray spectrum?

Answer: The wavelength will decrease by 2 times

4. In which case will there be a greater increase in the X-ray flux: when the current is doubled, but the voltage is maintained, or, conversely, when the voltage is doubled, but the current is maintained?

Answer: When the voltage is doubled.

5. Which radiation will be harsher: X-ray radiation, which occurs at a voltage of 160 kV, or gamma radiation with an energy of E=0.074 MeV?

Answer: the energy of the X-ray photon is greater than the energy of the gamma-ray photon, hence the X-ray radiation is more rigid. The wavelength of the X-ray radiation is less than the wavelength of the gamma radiation, therefore, the X-ray radiation is more rigid.

6. Determine the velocity of the electrons incident on the anticathode of the X-ray tube, if the minimum wavelength in the continuous spectrum of X-rays is 0.01 nm.

Answer: v=2.1·108 m/s

7. For X-ray diagnostics of soft tissues, special, so-called contrast agents are used. For example, the stomach and intestines are filled with a porridge-like mass of barium sulfate (BaSO4). Compare the mass attenuation coefficients of barium sulfate and soft tissue (water).

Answer: The mass attenuation coefficient is 354 times greater for barium sulfate.

8. Find the boundary of the bremsstrahlung X-ray radiation (frequency and wavelength) for a voltage of 2 kV.

Answer: f=4.8·1017Hz, l=6.2·10-10m.

9. The voltage applied to the anode in the X-ray tube was reduced from 300 kV to 100 kV. What will happen to the boundary length of the Bremsstrahlung X-ray spectrum?

Answer: The wavelength will shift to the region of larger wavelengths.