When kVp is increased, what happens?

kVp

1. What effect does increasing kVp have on the total x-ray emission spectrum?

Increasing the kVp setting increases the quality or energy of the electrons striking the anode. Higher energy photons are created and the number of high-energy photons also increases. The total number of photons produce will also increase.

2. How will decreasing kVp affect the energy level of the highest-energy photons?

Decreasing the kVp will decrease the energy level of the highest-energy photons.

3. How will decreasing the kVp affect the energy level of the lowest-energy photons?

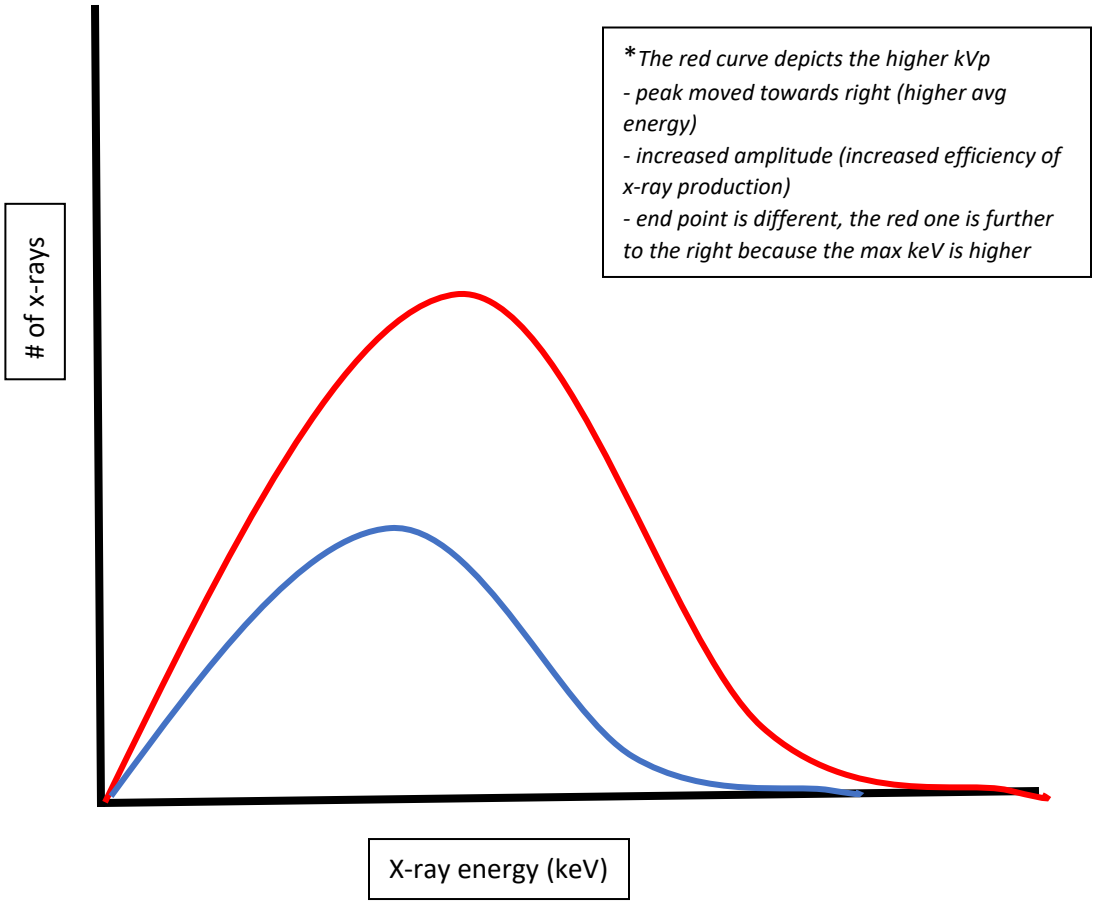
Decreasing the kVp will not affect the energy level of the lowest-energy photons.

4. How will increasing the kVp change the energy level of the lowest energy-photons?

Increasing the kVp will not affect the energy level of the lowest-energy photons

5. How is the average energy of the photons affected when the kVp is increased?

When the kVp is increased, the average energy of the photons will increase, as we will now be calculating 30-40% of a higher value (higher kVp).



When mAs is increased, what happens?

mAs

6. What effect does increasing mAs have on the total x-ray emission spectrum?

When mAs is increased, this increases the quantity of electrons interacting at the anode, thus increasing the quantity of x-rays produced. This will result in the amplitude will increasing in height.

7. How will decreasing mAs affect the energy level of the lowest-energy photons?

Decreasing mAs will not affect the lowest-energy photons.

8. How will increasing the mAs affect the energy level of the lowest-energy photons?

Increasing mAs will not affect the lowest-energy photons

9. How does increasing mAs affect the energy level highest-energy photons?

Increasing mAs does not affect the energy level of the highest-energy photons.

10. How does decreasing mAs affect the average energy of the photons?

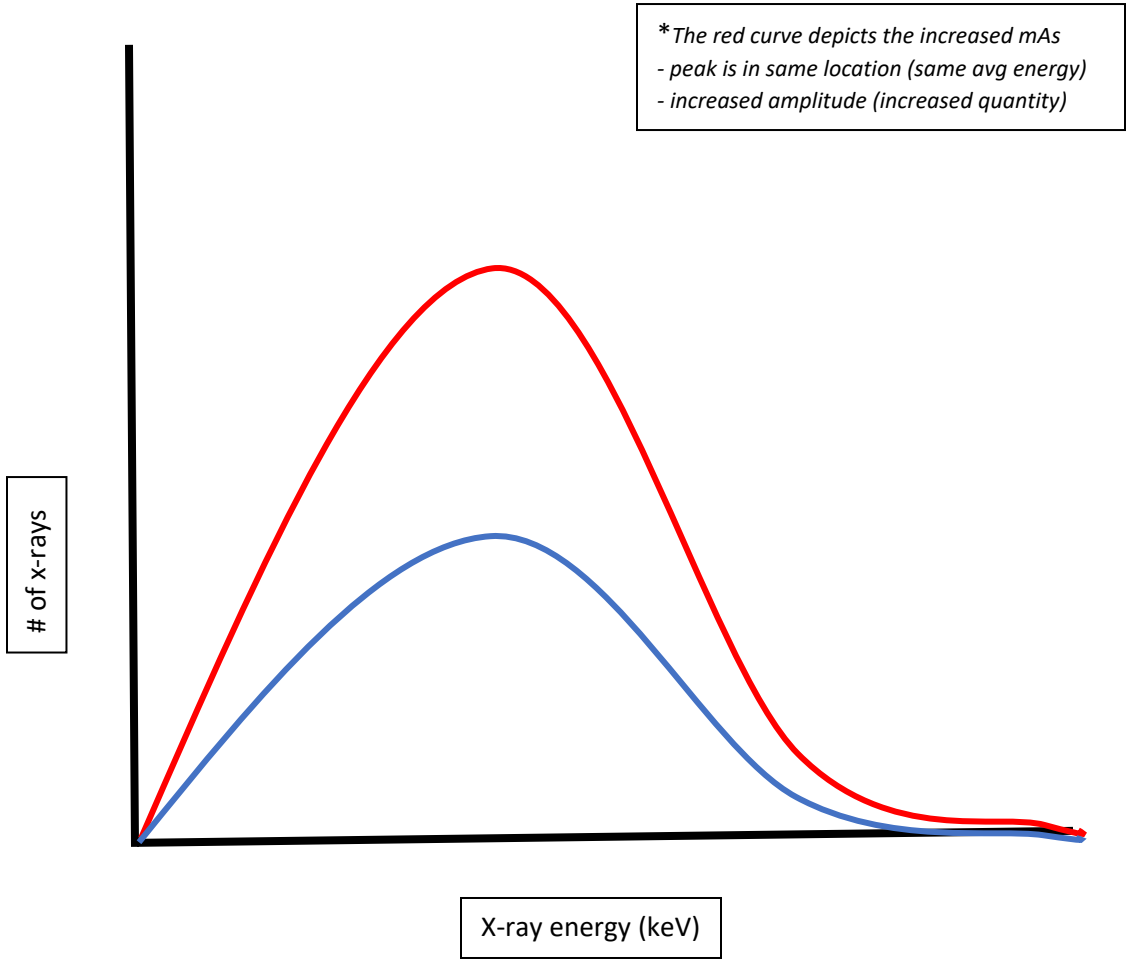
Decreasing mAs does not affect the average energy of the photons, majority will still be around the 30-40% mark.

11. How does changing the mAs affect the energy levels of the discrete emission spectrum?

Changing mAs does not affect the binding energies, therefore no effect on the discrete (characteristic) emission spectrum.

12. If mAs is doubled, what effect would be seen on the emission spectrum?

If mAs is doubled, the quantity of photons produced is doubled, so the amplitude of the emission spectrum will double in height.



**The red curve depicts the increased mAs*
- peak is in same location (same avg energy)
- increased amplitude (increased quantity)

What is affected by the target material?

Target Material

13. What effect does the atomic number of the target material have on the x-ray emission spectrum?

As the atomic number is increased, the efficiency of the production of Bremsstrahlung radiation increases. The amplitude increases because the number of photons at every energy level is increased. Not only are there more photons created but also of a higher average energy.
As the atomic number of the target increases so does the characteristic (discrete) spectrum, location will change

14. What effect does the increasing atomic number of the target material have on the energy level of the lowest-energy photons?

Atomic number will not affect the energy level of the lowest-energy photons

15. What effect does decreasing the atomic number of the target material have on the energy level of the highest-energy photons?

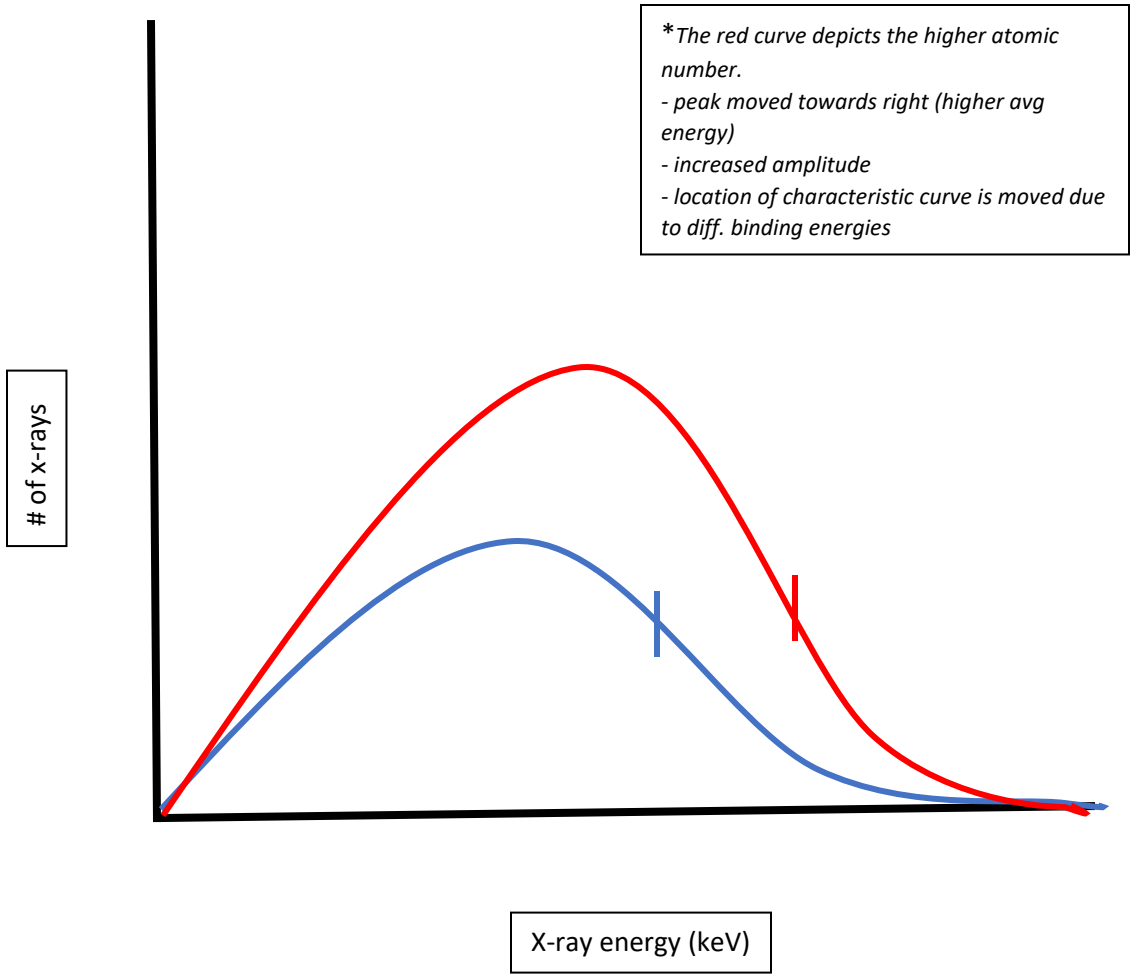
Atomic number will not affect the energy level of the highest-energy photons

16. What effect does increasing the atomic number of the target material have on the characteristic emission spectrum?

The location of the characteristic spectrum will move to the right, with a higher atomic number, the binding energies of the electrons will be higher, resulting in higher energy characteristic x-rays.

17. What effect does increasing the atomic number of the target material have on the average energy of the x-ray photons?

The average energy will be higher, because of the larger nucleus, it will be able to have greater influence on the incident electrons.



**The red curve depicts the higher atomic number.*
- peak moved towards right (higher avg energy)
- increased amplitude
- location of characteristic curve is moved due to diff. binding energies