

Answers to selected questions

Chapter 18

Q6. No. Each element, such as carbon or oxygen, has a characteristic atomic mass that is unique to that element. An oxygen atom is heavier than a carbon atom by the approximate ratio of 16 / 12 . (See table 18.1.)

Q12. The cathode ray particles seemed to have the same mass and charge regardless of the material of the cathode from which they were ejected. This and the fact that the mass appeared to be much less than that of the smallest atom suggested that these particles (electrons) were atomic building blocks.

Q18. We now know that most of the mass of an atom is contained in a very tiny center called the nucleus. Most of the volume of the atom is made up of electrons orbiting the nucleus and they have very little mass. Alpha particles are much more massive than the electrons so unless an alpha particle passes close to a nucleus, it will not be deflected very much.

Q24. No. Planck's theory required that light could be emitted only with discrete amounts of energy. The energy amount depends upon the frequency (and wavelength) of the light according to Planck's relationship $E = hf$, where h is Planck's constant and f is the frequency of the light.

Q30. The atomic structure of sodium consists of one electron orbiting about stable closed electron shells containing the other ten electrons. Lithium has one electron outside a closed shell containing the other two electrons. The chemical properties are determined primarily by these single outermost electrons causing sodium and lithium to form similar compounds with other elements.