6.3 The stability curve

The stability curve (Figure 6.3.1) shows all the stable isotopes of an element as data points, where each data point represents the number of both protons and neutrons within the nucleus. If a nuclide exists with p protons and n neutrons and this data point is *not* on the stability curve, then it can be concluded that the nuclide is *unstable*, and likely to undergo radioactive decay.

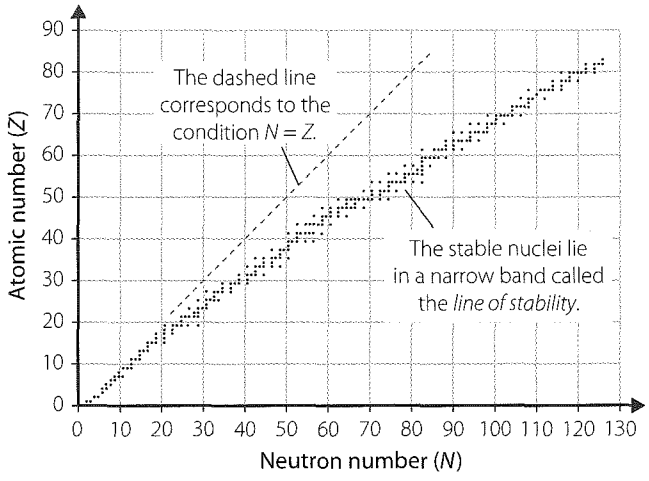

FIGURE 6.3.1 The stability curve

QUESTIONS

1 A neutron to proton ratio can be found by dividing the number of neutrons (N) by the number of protons (Z). According to Figure 6.3.1, there are three table isotopes of neon. List these isotopes and their N:Z ratios.

13:10

No more isotopes left. I don't know what 3 isotope bro is talking about.

2 As the atomic number increases, the N:Z ratio increases as well. Suggest an explanation for this.

The N:Z ratio increases with the atomic number to counter electrostatic repulsion from higher number of protons with neutrons to increase strong force, keeping the nucleus together.

3 State whether the following isotopes will be stable according to the stability curve.

a $^{127}_{53}\mathrm{I}$

Stable.

b Nickel-63

Unstable.

c The isotope with 73 protons and 177 nucleons

Stable.

d Rubidium isotope with 48 neutrons

Stable.