Solutions

Each answer shows the steps, then the **result**.

2.1

- atoms of the same element (same number of protons) with different numbers of neutrons

2.2

- protons 17; neutrons $37 - 17 = 20$; electrons 17

3.1 B

- Isotopes have the same number of protons

3.2 B

- The same electron arrangement gives the same chemistry

3.3

(a)

- $A_r = \dfrac{(10 \times 20) + (11 \times 80)}{100} = \dfrac{1080}{100} = 10.8$

(b)

- ^{11}B has one more neutron, so more mass in the same volume

3.4

- $A_r = \dfrac{(63 \times 69) + (65 \times 31)}{100} = \dfrac{6362}{100} = 63.6$

3.5

(a)

- $A_r = \dfrac{(64 \times 48.6) + (66 \times 27.9) + (67 \times 4.1) + (68 \times 18.8) + (70 \times 0.6)}{100} = \dfrac{6546.9}{100} = 65.469 = 65.5$; this is **zinc**

(b)

- Yes. Chemical properties depend on the electron arrangement, which is fixed by the proton number and is the same for every isotope — the extra neutrons take no part in bonding

(c)

- The height of a peak is proportional to the relative abundance of that isotope; only 4.1% of the atoms are ^{67}X, so few ions of that mass reach the detector

(d)

- Relative atomic mass is a **ratio** of masses, so it has no units; and it is a weighted mean over all the isotopes, not the mass of any single atom