Core Worksheet – Chapter 2

1 Work out the numbers of protons, neutrons and electrons in each of the following: [6]

a $^{32}_{16}S$

b $^{79}_{35}Br$

c $^{209}_{83}Bi$

d ^{51}V

e ^{195}Pt

f ^{137}Ba

2 In which of the following is the number of neutrons greater than the number of electrons? [1]

$^{40}_{20}Ca^{2+}$ $^{81}Br^{-}$ $^{31}P^{3-}$ $^{207}Pb^{2+}$ $^{141}Pr^{3+}$

3 True or false? There is an element in the periodic table for which the number of neutrons is greater than the total number of protons + electrons. [1]

4 Define the term **isotopes**. [2]

5 In each of the following cases work out the relative atomic mass of the element to **two** decimal places:

a Rhenium has two naturally occurring isotopes with natural abundances:

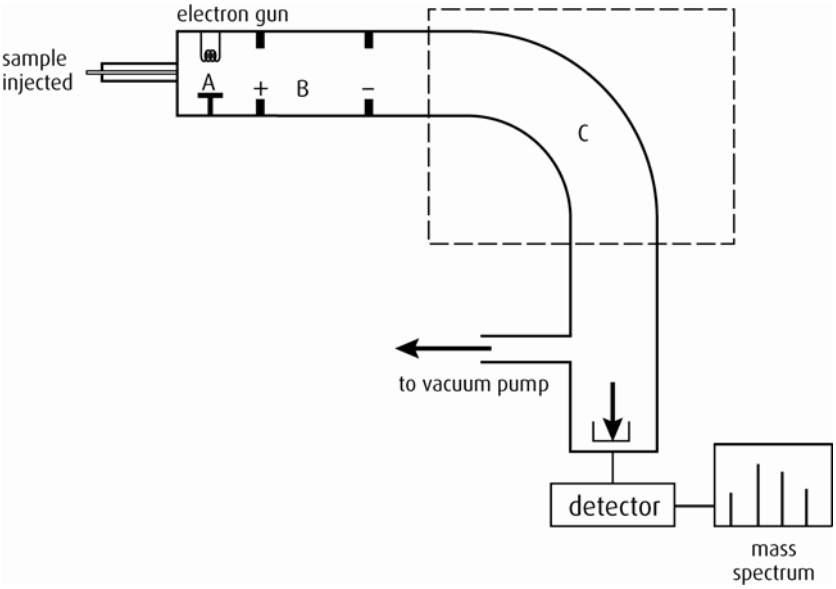
^{185}Re 37.40% ^{187}Re 62.60% [2]

b Neodymium has seven naturally occurring isotopes with abundances:

^{142}Nd 27.13% ^{146}Nd 17.19%
^{143}Nd 12.18% ^{148}Nd 5.76%
^{144}Nd 23.80% ^{150}Nd 5.64%
^{145}Nd 8.30% [2]

6 Europium has two naturally occurring isotopes, Eu-151 and Eu-153, and a relative atomic mass of 151.96. Calculate the percentage abundance of each isotope of europium. [2]

7 The diagram shows a simplified diagram of a mass spectrometer.



Explain the processes that occur in each of the regions **A**, **B** and **C**. [7]

8 Give the electronic configurations of the following atoms and ions: [10]

a O **e** Ar **i** K

b Si **f** Ca^{2+} **j** S^{2-}

c Cl **g** F^-

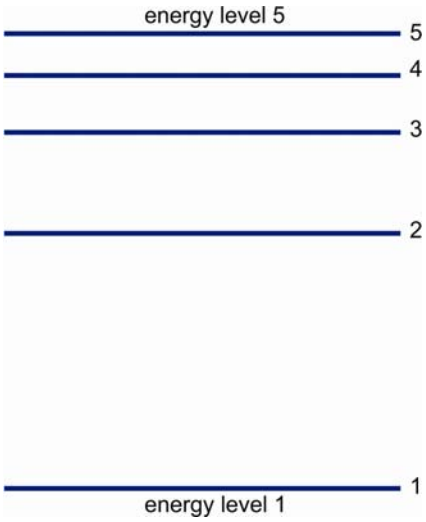
d Na^+ **h** N^{3-}

9 Arrange the following in order of increasing energy: [2]

ultraviolet radiation **red light** **infrared radiation** **green light**

10 The emission spectrum of hydrogen in the visible region, when observed through a spectroscope, consists of a series of coloured lines on a black background. Explain how the different lines in the spectrum arise. [3]

11 The diagram on the right represents the energy levels in a hydrogen atom. Draw arrows on the diagram to represent the following transitions: [3]



a a line in the infrared spectrum of a hydrogen atom

b the lowest energy line in the visible spectrum of hydrogen

c a line in the Lyman series for hydrogen.

12 Write an equation for the ionisation energy of hydrogen and explain how a value for the ionisation energy may be obtained from the emission spectrum of hydrogen. [3]

