ATOMIC THEORY

I am able to:

1 Complete the following sentence:

Atoms contain a …… charged nucleus composed of …… and …….

2 Complete the table:

Particle	Relative Mass	Relative Charge
PROTON		
NEUTRON		
ELECTRON		

3 Complete the following sentence:

Electrons have a …… charge and are found……

4 Virtually all the mass of an atom is due to the ……

5 Explain the terms *mass number* (A), *atomic number* (Z) and *isotope*.

6 Write the symbol for the element which has A = 108 and Z = 47.

7 State the number of protons, neutrons and electrons in each of the following:

^{65}Cu ^{73}Ge $^{15}N^{3-}$ $^{137}Ba^{2+}$

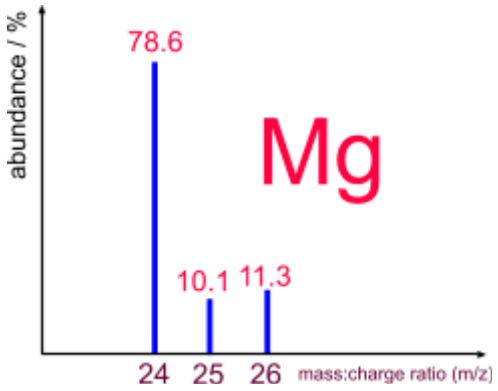
8 Name the instrument which is used to find the isotopic composition of an element so that its relative atomic mass can be determined.

9 Determine the relative atomic mass of copper given the following natural abundances:

^{63}Cu 76.0 % ^{65}Cu 24.0 %

10 Determine the natural abundance of ^{11}B given that boron consists of two isotopes, ^{10}B and ^{11}B, and the relative atomic mass is 10.80.

11 Use the mass spectrum shown to determine the relative atomic mass of magnesium to 1 decimal place.



12 Given that the relative atomic mass of iridium is 192.22 and that it has only 2 isotopes – ^{191}Ir and ^{193}Ir. Explain whether ^{191}Ir or ^{193}Ir is the more common isotope.

13 State the regions of the electromagnetic spectrum.

14 State the relative frequencies, energies and wavelengths of the regions of the electromagnetic spectrum.

15 Arrange ***UV radiation*** ***blue light*** ***infrared radiation*** ***red light*** in order of:

(a) increasing frequency (lowest first) (b) decreasing wavelength (longest first)

(c) increasing energy (lowest first)

16 Distinguish between a continuous spectrum and a line spectrum

17 Describe the emission spectrum of a hydrogen atom – draw a diagram (include at least 4 lines and label the direction in which frequency increases)

18 Explain how a line in the emission spectrum arises.

19 Explain how different series of lines arise.

20 State whether each of the following transitions in the hydrogen emission spectrum would produce a line in the visible, infrared or ultra violet region of the electromagnetic spectrum.

$n = 5 \rightarrow n = 1$ $n = 4 \rightarrow n = 3$ $n = 6 \rightarrow n = 2$ $n = 10 \rightarrow n = 3$

21 Select the highest energy transition in the hydrogen emission spectrum from the following list:

$n = 4 \rightarrow n = 2$ $n = 12 \rightarrow n = 3$ $n = 2 \rightarrow n = 1$ $n = 15 \rightarrow n = 2$

22 Explain the term *orbital*.

23 State the relative energies of s, p, d and f orbitals within any shell (main energy level).

24 State the number of s, p, d, f orbitals within s, p, d, f subshells (sub-levels).

25 State the number of subshells (sub energy levels) and orbitals in the 4^{th} main energy level (shell).

26 Sketch the shape of an s and p_x, p_y and p_z orbitals.

27 State the full electron configurations of: N P Ti Cr Fe Cu Se Kr

28 State the condensed electron configurations of: O Cl Mn As

29 Draw orbital diagrams to represent the electron configuration of: B Si Ni

30 State the full electron configuration of the following ions: Mg^{2+} S^{2-} Fe^{2+} Cu^{2+} Ga^{3+}