S.4. chemistry exercises

1.The table below shows the ralative abundance of the element titanium Ti.

Isotope	^{46}Ti	^{47}Ti	^{48}Ti	^{49}Ti	^{50}Ti
%abundance	8.02	7.31	73.81	5.54	5.32

a. Using the information above.

i. Calculate the relative atomic mass of Ti. (3marks)

ii. Skecth the mass spectrum of Ti. (2marks)

b. There are three common isotopes of oxygen with mass numbers 16,17 and 18.

Identify the possible peaks that would be observed in the mass spectrum of O_2^+. (3marks)

2. The first ionisation energies of an element X are shown below.

IE/kJmol^{-1}	1st	2nd	3rd	4th	5th	6th	7th	8th
	786	1580	3230	4360	16000	20000	23600	29100

i. Define the term first ionisation energy.

ii. State the factors that affect the values of first ionisation energy.

iii. To which group in the periodic table does element X belongs and give a reason for your answer.

iv. Suggest the formulae for two chlorides of X.

3. State and explain the trends in atomic radius

a. across the period.

b. down the group.

4. The mass spectrum of a sample Y contains three peaks with mass/charge ratio and relative intensities show below.

m/z	24	25	26
Relative intensity	1	0.127	0.139

a. Explain why Y gives three peaks in its mass spectrum . (2marks)

b. Using the information in the table to calculate

i. the percentage abundancies of Y. (2marks)

ii. the relative molecular mass of Y. (2marks)

c. Identify Y. (1mark)

d. Explain why values of RAM has no units. (1mark)

5. a. Define the flowing terms as applied in atomic structure

i. Atom. (1mark)

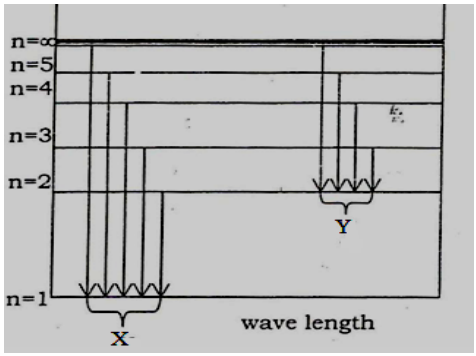
ii. Relative intensity. (1mark)

iii. Relative atomic mass. (1mark)

b. Describe the main steps in the operation of the mass spectrometer. (7marks)

6. a.Explain the origin of line spectrum of hydrogen. (4marks)

b. The diagram below shows part of the series in the hydrogen spectrum.



i. Identify spectral series X and Y. (2marks)

ii. Which of the two series gives rise invisible and visible spectrum? (2marks)

7.a Define a spectrum and give two types of the atomic spectra. (3marks)

b. Calculate the wave length, frequency and hence the energy of transition involving n=6 to n=3 in hydrogen atom.

Given $R=109677cm^{-1}$, $h= 6.63 \times 10^{-34}$ JS. (8marks)

8. Write down the electronic configuration of the following elements using s, p...notation.

(a) Germanium (Ge) atomic number = 32

(b) Silicon (Si) ,atomic number = 14

(c) Potassium (K) atomic number = 19

(d) Tin (Sn) atomic number = 50

(e) Krypton (Kr) atomic number =36. (10marks)