S5 TOPICAL BREEZER 2023

TOPIC; PARTICULATE NATURE OF MATTER

DATE; 9th MARCH 2023

NAME…….. **COMBN**…….

INSTRUCTION; Attempt all questions

1. (a) Describe how in a mass spectrometer the ions are;

(i) formed

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(ii) accelerated

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(iii) separated

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(iv) detected

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b) State two advantages and one disadvantage of using mass spectrometer

Advantages

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Disadvantage

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c) State **one** use of a mass spectrometer to a chemist.

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2. (a) Bromine has two isotopes *Br-79* and *Br-81* and the mass spectrum of bromine shows peaks at **m/e** of 158, 160 and 162.
   (a)Write the formula(e) of the ion(s) corresponding to the peak(s)

Peak value	***Formula of ion***
158	
160	
162	

(b) By calculation, deduce which of the isotopes in (b) above is most abundant if the relative atomic mass of bromine is 79.9.

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(c) Sketch a mass spectrum for bromine using the above information.

3. The mass spectrum of a sample of magnesium contains three peaks with mass-charge ratios and relative intensities show below.

m/z	24	25	26
Relative intensity	1	0.127	0.139

(i) Explain why magnesium gives three peaks in its spectrum.

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(ii) (ii) Use the information in the table to calculate an accurate value for the relative atomic mass of magnesium.

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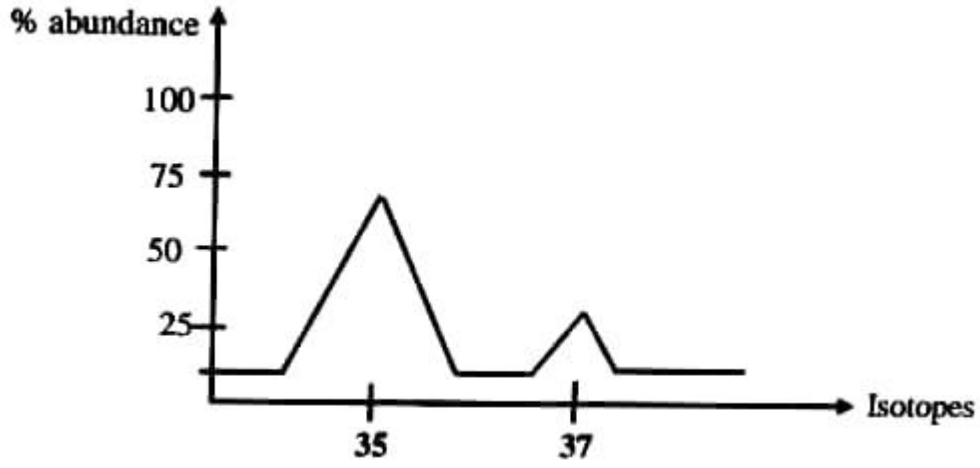
4. **The figure below shows a mass spectrum for chlorine.**



Determine the relative atomic mass of chlorine

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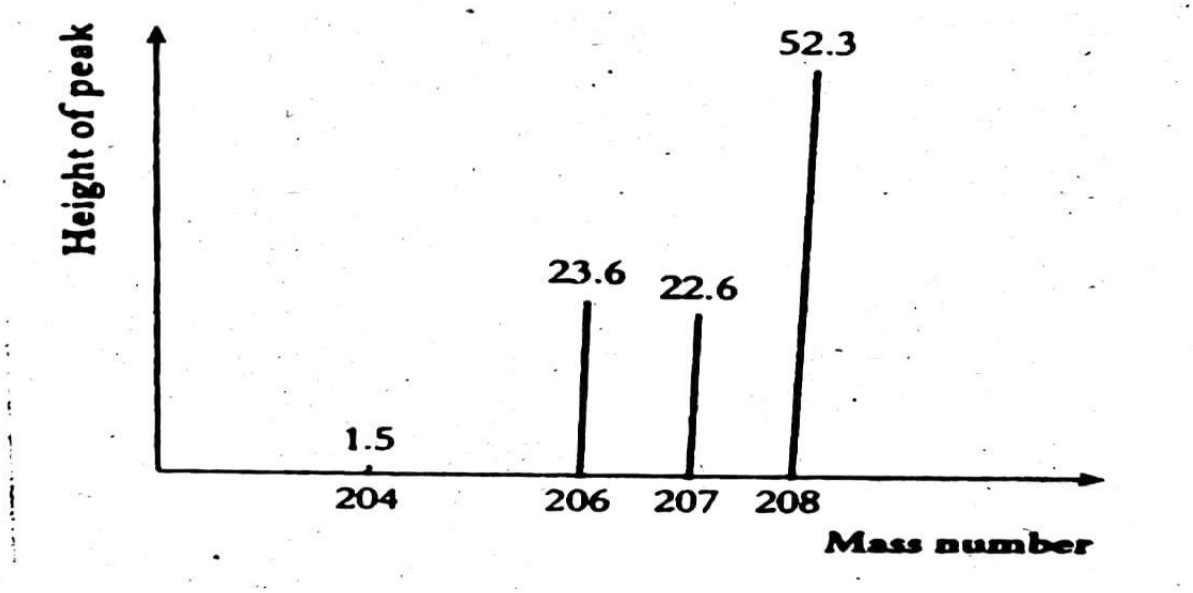
5. **The figure below shows the mass spectrum of lead. The heights of the peaks and the mass numbers of the isotopes are shown on the figure.**



(a)Calculate the relative atomic mass of lead.

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(b) Explain why the peaks have different heights.

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6. (a) State Graham's law of gaseous diffusion. (1mark)

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(b) **Two pieces of cotton wool were each soaked separately in concentrated ammonia solution and concentrated hydrochloric acid respectively and simultaneously inserted into opposite ends of a horizontal wide glass tube. After a short time a white ring was across the tube. If the distance between the inner surfaces of the cotton wool plugs is 50cm.**

(i) Name the white ring

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(iii) Write the equation leading to formation of the white ring.

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(iii) Determine how far from the ammonia plug the white ring is formed.

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7. (a) A gas ***Q*** diffuses 4 times as rapidly as sulphur dioxide under the same conditions. If the density of sulphur dioxide under the same conditions of temperature and pressure is, calculate the density of ***Q***.

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(b) 250 cm^3 of an **alkene** diffuse through a porous medium in 10 seconds and 716 cm^3 of oxygen diffuse through the same medium in 25 seconds under the same conditions. Calculate the molecular mass of the **alkene** and deduce its structural formula.

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END.

WELCOME TO CHEMISTRY CLASS 2023.