TIME OF FLIGHT MASS SPECTROMETRY 2

ToF Mass Spectrometry 1

Lithium = 6.93

Gallium = 69.80

Iron = 55.91

ToF Mass Spectrometry 2

1   a   207.24

    b $^{208}Pb^+$

    c $^{204}Pb^+$

2   a   electron impact

    b   72

    c   molecule containing one ^{13}C, or molecule containing one ^2H

    d   molecules containing more than one ^{13}C or ^2H; low abundance so very few of these relative to those without

3   a $CH_3{}^{35}Cl$ and $CH_3{}^{37}Cl$ in sample

    b   3:1

4   a   52.06

    b $^{52}Cr^+$

    c $^{50}Cr^+$

    d   for each particle: $\frac{1}{2}mv^2 = \frac{1}{2}mv^2$ and v = d/t ; as d is the same for both particles,

       therefore m/t^2 is equal for both particles

       $50/t^2 = 54/(1.486 \times 10^{-5})^2$

       $t^2 = 2.045 \times 10^{-10}$

       $t = 1.4 \times 10^{-5}$ s (2SF)

5
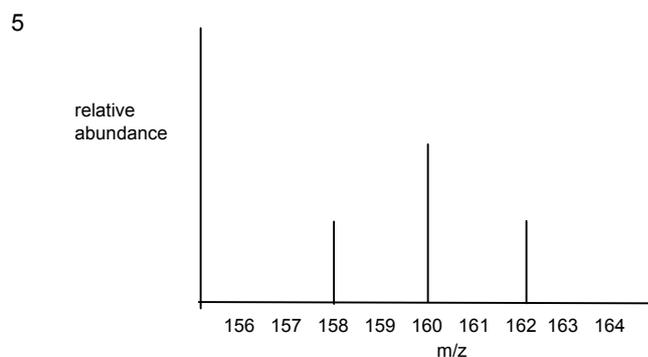
6   let % of ^{69}Ga = a, $\therefore$ % of ^{71}Ga = 100 – a

    $\dfrac{69x + 71(100 - a)}{100}$ = 69.72

    69a + 7100 – 71a = 6972

    128 = 2a

    a = 64.0% $\therefore$ ^{69}Ga = 64.0%, ^{71}Ga = 36.0%

7   % of ^{21}Ne + ^{22}Ne = 100 – 90.5 = 9.5

    let % of ^{21}Ne = a, $\therefore$ % of ^{22}Ne = 9.5 – a

    $\dfrac{(20 \times 90.5) + 21a + (22(9.5 - a))}{100}$ = 20.18

    1810 + 21a + 209 – 22a = 2018

    1.0 = a

    $\therefore$ ^{21}Ne = 1.0%, ^{22}Ne = 8.5%

8   a   mass of one $^{18}O^{+}$ ion = $\dfrac{0.018}{6.022 \times 10^{23}}$ = 2.99 x 10^{-26} kg

    b $t = d\sqrt{\dfrac{m}{2KE}}$ = $0.75\sqrt{\dfrac{3.014 \times 10^{-26}}{2 \times 2.50 \times 10^{-15}}}$ = 1.84 x 10^{-6} s

9   83.89