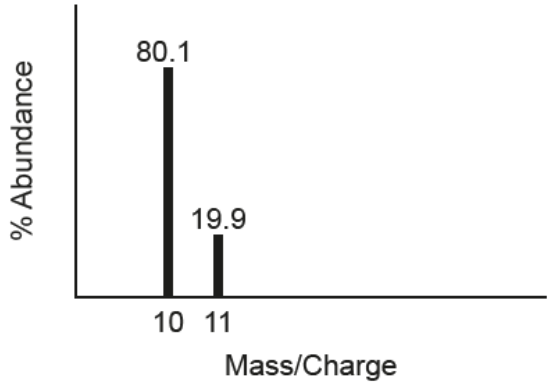
Atom [11 marks]

1. [Maximum mark: 1]

What is the A_r of the element as determined from its mass spectrum below?



A. 10.0

B. 10.2

C. 10.5

D. 10.8 [1]

2. [Maximum mark: 1]

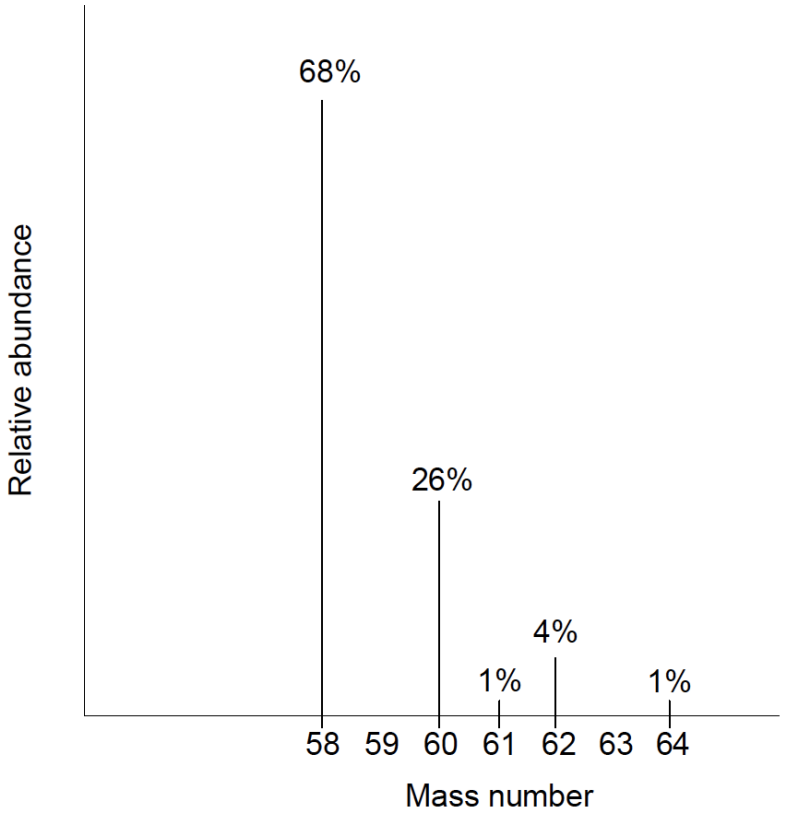
What is the correct number of subatomic particles for $^{79}_{34}Se^{2-}$?

	Protons	Electrons	Neutrons
A.	34	36	79
B.	34	36	45
C.	36	45	36
D.	79	81	34

[1]

3. [Maximum mark: 5]

(a) Determine the relative atomic mass of nickel from the mass spectrum shown.



[1]

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(b.i) Deduce the nuclear symbol, ${}^{A}_{Z}X$, for an ion of nickel-58 with 26 electrons. [1]

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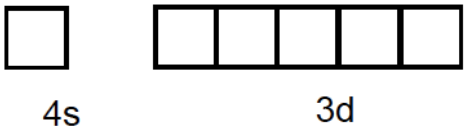
(b.ii) Draw arrows to represent electrons in the orbital diagram for this ion.



[1]

(b.iii) Explain how the ions are held together in nickel chloride, and why it only conducts electricity when molten. [2]

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4. [Maximum mark: 1]

Gallium (A_r = 69.72) consists of two stable isotopes, Ga-69 and Ga-71.

What is the relative abundance of Ga-71?

A. 36 %

B. 40 %

C. 60 %

D. 64 % [1]

5. [Maximum mark: 1]

A beam containing two different kinds of particles is passed through oppositely charged plates with the results shown in the diagram.

What conclusion can be drawn from this observation?

A. Particle 1 has a larger mass than particle 2.

B. Particle 2 has a larger mass than particle 1.

C. Particle 1 is positively charged.

D. Particle 2 is positively charged. [1]

6. [Maximum mark: 1]

Which quantities are different between two species represented by the notation $^{128}_{52}\mathrm{Te}$ and $^{128}_{53}\mathrm{I}^-$?

A. The number of protons only

B. The number of protons and electrons only

C. The number of protons and neutrons only

D. The number of protons, neutrons and electrons [1]

7. [Maximum mark: 1]

What is the relative atomic mass of a sample of chlorine containing 70 % of the ^{35}Cl isotope and 30 % of the ^{37}Cl isotope?

A. 35.4

B. 35.5

C. 35.6

D. 35.7 [1]