Oxford Cambridge and RSA

AS Level Chemistry A

H032/01 Breadth in chemistry

Question Set 13

1. This question is about elements from the p-block of the periodic table.

(a) Silicon exists as a mixture of three isotopes, ^{28}Si, ^{29}Si and ^{30}Si.

(i) Complete the table to show the atomic structure of ^{30}Si.

	Protons	Neutrons	Electrons
^{30}Si	14	16	14

[1]

(ii) A sample of silicon is analysed by mass spectrometry.

The mass spectrum shows peaks with the relative abundances below.

- ^{28}Si 92.23%
- ^{29}Si 4.68%
- ^{30}Si 3.09%

$Ar = \frac{(92.23 \times 28) + (4.68 \times 29) + (3.09 \times 30)}{100}$

$Ar = 28.11$

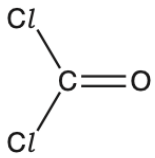
Calculate the relative atomic mass of silicon in the sample.

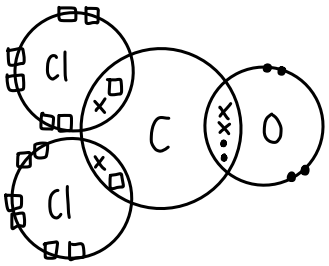
Give your answer to **two** decimal places.

[2]

(b) Phosgene, $COCl_2$, exists as simple molecules.

The displayed formula of a phosgene molecule is shown below.





(i) Draw a '*dot-and-cross*' diagram of a phosgene molecule.

Show outer electrons only.

[1]

(ii) Name the shape of a phosgene molecule and explain why it has this shape.

[3]

b)ii) trigonal planar - the bonding pairs of electrons repel to be as far apart as possible, making the bond angles 120°

(c) Why are silicon, carbon, oxygen and chlorine all classified as p-block elements?

[1]

c) their outer electron is in the p sub-shell

Total Marks for Question Set 13: 8