2.1 Atomic & Electronic Structure

Question Paper

Course	DP IB Chemistry
Section	2. Atomic Structure
Topic	2.1 Atomic & Electronic Structure
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

A periodic table is needed for this question

In which of the following species are the numbers of protons, neutrons and electrons all different?

A $^{23}Na^{+}$ **B** ^{27}Al **C** $^{19}F^{-}$ **D** $^{32}S^{2-}$

[1 mark]

Question 2

The atomic number of an element gives the number of protons in the nucleus which is also equal to the number of electrons. Which statement explains why atoms are neutral?

A one proton has a mass 1840 times greater than one electron

B the charge on an electron is equal and opposite to the charge on a proton

C the difference in charge between electrons and protons is balanced by the neutrons

D electrons are spread out in shells around the nucleus while protons are concentrated inside the nucleus

[1 mark]

Question 3

Which statements correctly describe the distribution of mass and charge in the atom?

1 the negative charge is concentrated in one area outside the nucleus

2 the mass is concentrated inside the nucleus

3 the negative charge is spread around outside the nucleus

A 1 and 3 **B** 1 and 2 **C** 2 and 3 **D** 1, 2 and 3

[1 mark]

Question 4

A periodic table is needed for this question

There are six unpaired electrons in atoms of element Z. What could element Z be?

A sulfur

B iron

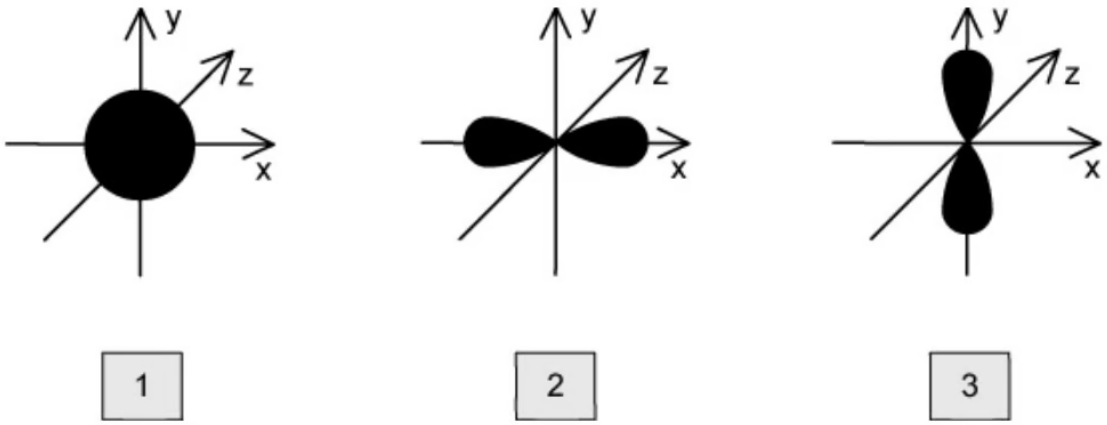
C carbon

D chromium

[1 mark]

Question 5

The diagram shows three orbitals labelled 1, 2 and 3.



1 2 3

What is the correct label for each orbital?

A p_x, p_y and p_z

B s, p_z and p_y

C s, p_x and p_z

D s, p_x and p_y

[1 mark]

Question 6

A periodic table is needed for this question

What is the electronic configuration of an ion with a single negative charge and atomic number 17?

A $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^6$

B $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

C $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^5$

D $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

[1 mark]

Question 7

A periodic table is needed for this question

What is the correct sequence for the orbitals shown in an atom of vanadium in order of decreasing energy?

A 3s 3p 4s 3d

B 4s 3d 3s 3p

C 4s 3d 3p 3s

D 3d 4s 3p 3s

[1 mark]

Question 8

The isotope $^{60}_{27}Co$ is used in the treatment of cancer cells in the body.
Which statements about this isotope are correct?

1 the charge on the nucleus is +27

2 there are 33 neutrons in the nucleus

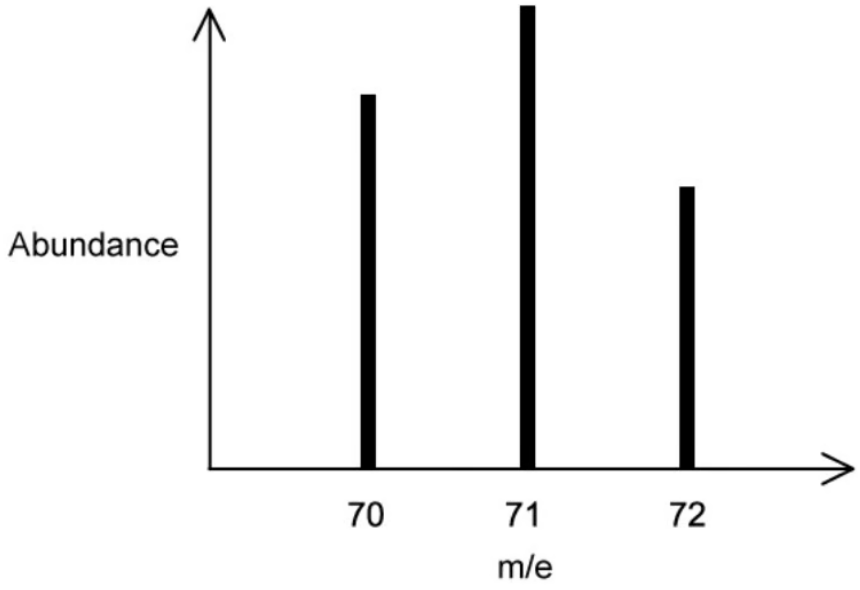
3 it has the same number of neutrons as other isotopes of cobalt

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 1, 2 and 3

[1 mark]

Question 9

The mass spectrum of element X is shown below.



Which of the following statements is correct?

A X has a relative atomic mass between 70 and 71

B The three isotopes of X are separated after being converted to anions

C The most abundant isotope of X contains 71 neutrons

D The isotope of X with mass 72 will be deflected the most

[1 mark]

Question 10

A periodic table is needed for this question

Which row correctly describes the subatomic particles found in $^{26}Mg^{2+}$?

	protons	neutrons	electrons
A	10	14	12
B	12	14	10
C	12	26	10
D	14	12	12

[1 mark]