

2.1 Atomic & Electronic Structure

Question Paper

Course	DPIB 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** $^{23}\text{Na}^+$ **B** ^{27}Al **C** $^{19}\text{F}^-$ **D** $^{32}\text{S}^{2-}$

[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

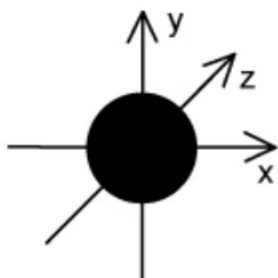
There are six unpaired electrons in atoms of element Z. What could element Z be?

- A** sulfur
- B** iron
- C** carbon
- D** chromium

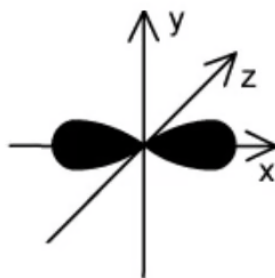
[1 mark]

Question 5

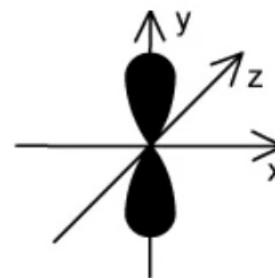
The diagram shows three orbitals labelled 1, 2 and 3.



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

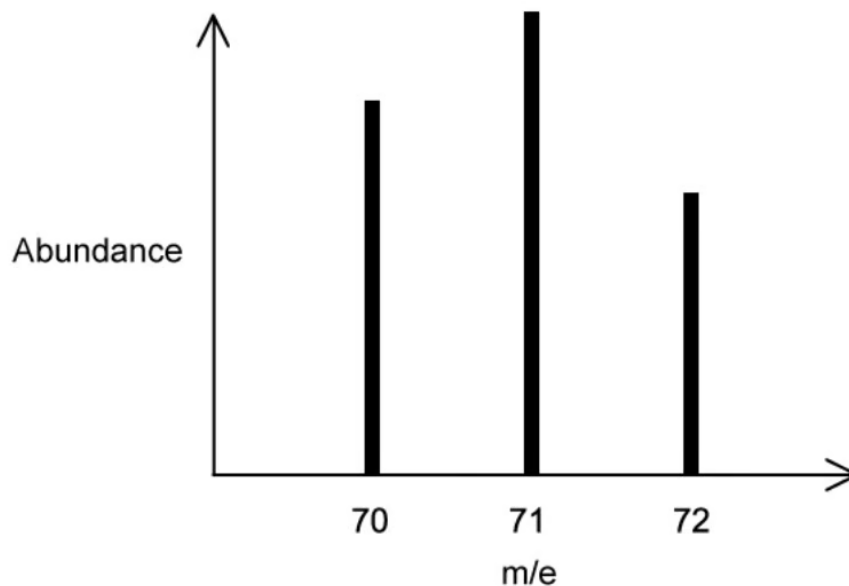
- 1 the charge on the nucleus is +27
- 2 there are 33 neutrons in the nucleus
- 3 it has the same number of neutrons as other isotopes of cobalt

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 $^{26}\text{Mg}^{2+}$?

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

[1 mark]