Anglo-Chinese School
(Barker Road)
A Methodist Institution
Founded in 1886

CHEMISTRY
DEPARTMENT OF SCIENCE

Name: ANSWERS ( ) Class: SEC 3

ATOMIC STRUCTURE – ASSIGNMENT

Multiple-Choice Questions [20 Marks]

TOTAL SCORE / 30

Write in your selected answer for the multiple-choice questions in the boxes provided.

1	2	3	4	5	6	7	8	9	10
C	D	C	A	D	A	C	B	D	C

11	12	13	14	15	16	17	18	19	20
D	A	D	C	D	D	C	D	D	C

1. The nucleus of an atom contains

A protons only.
B electrons and protons only.
C protons and neutrons only.
D neutrons only.

2. The mass number of an atom or an ion can be calculated by

A number of protons + electrons.
B number of protons + nucleons.
C number of electrons + neutrons.
D number of nucleons.

3. Which one of the following statements is **not** correct?

A All hydrogen atoms contain one proton.
B A proton has the same mass as a neutron.
C An electron is 1840 times heavier than a proton.
D A proton has the same but opposite charge as an electron.

4. Which of the following statements is true for all neutral atoms?

A number of protons = number of electrons
B number of protons = number of neutrons
C number of neutrons = number of electrons
D number of neutrons = number of protons + electrons

5. The element, symbol **E**, is written as ${}^{Z}_{A}\mathrm{E}$. Which of the following is correct?

A The number of neutrons in the nucleus is Z.
B There are A electrons in the nucleus.
C There are (Z – A) electrons surrounding the nucleus.
D There are A protons in the nucleus.

6. An iodine atom has nucleon number 127 and proton number 53. The atom contains

A 53 electrons **B** 53 neutrons **C** 74 electrons **D** 127 neutrons

7. Which of the following shows an isotope of sulfur with 16 protons and 18 neutrons?

A $^{18}_{16}S$ **B** $^{32}_{16}S$ **C** $^{34}_{16}S$ **D** $^{18}_{34}S$

8. The number of neutrons present in an atom of manganese represented as $^{55}_{25}Mn$ is

A 25 **B** 30 **C** 55 **D** 75

9. The atoms $^{31}_{15}P$ and $^{32}_{16}S$ have the same number of

A protons **B** nucleons **C** electrons **D** neutrons

10. Which element in the table has atoms each containing 24 neutrons?

element	atomic number	mass number
A	8	16
B	12	24
C	21	45
D	22	48

11. Which of the following nuclei contains 90 protons and 144 neutrons?

A $^{90}_{54}\mathbf{X}$ **B** $^{144}_{54}\mathbf{X}$ **C** $^{144}_{90}\mathbf{X}$ **D** $^{234}_{90}\mathbf{X}$

12. Which of the following atoms has fewer neutrons than protons in its nucleus?

A $^{3}_{2}He$ **B** $^{7}_{3}Li$ **C** $^{9}_{4}Be$ **D** $^{11}_{5}B$

13. The relative atomic mass of naturally occurring chlorine is **not** a whole number. The most important reason for this is that

A chlorine is radioactive.
B the mass of the electrons has been included.
C naturally occurring chlorine cannot be obtained pure.
D chlorine is made up of more than one type of atom.

14. Identify the missing word in the sentence below.

"The …… electron shell (energy level) is able to accommodate up to a maximum of 18 electrons, but is generally stable after 8 electrons."

A first **B** second **C** third **D** fourth

15. The table shows the number of protons, neutrons and electrons in four ions.
For which ion is the data correct?

	ion	protons	neutrons	electrons
A	$^{40}_{20}Ca^{2+}$	20	20	20
B	$^{19}_{9}F^{-}$	9	10	8
C	$^{18}_{8}O^{2-}$	10	8	12
D	$^{23}_{11}Na^{+}$	11	12	10

16. An atom of argon has 18 electrons. Which of the following do **not** have 18 electrons?

A Ca^{2+} **B** Cl^{-} **C** K^{+} **D** O^{2-}

17. When a magnesium atom (Mg) becomes a magnesium ion (Mg^{2+}), it

A gains two electrons.
B gains two protons.
C loses two electrons.
D loses two protons.

18. Which of the following best describes a similarity and a difference between isotopes of the same element?

	similarity	*difference*
A	boiling point	number of protons
B	electronic configuration	relative atomic mass
C	nucleon number	chemical properties
D	number of electrons	melting point

19. Hydrogen occurs as three isotopes, ^{1}H, ^{2}D and ^{3}T.
Which of the following statements pertaining to the three isotopes is true?

A An ion of D^{+} contains two electrons.
B D has twice the number of electrons as H.
C H and D have the same number of nucleons.
D T has twice the number of neutrons compared to D.

20. Which of the following molecules contains the highest number of protons?

A C_3H_8 **B** NH_3 **C** PCl_3 **D** SO_3

Structured Questions [10 Marks]

21. (a) Define the term 'isotopes'. [1]

Two or more atoms with the same number of protons, but a different number of neutrons/nucleons.

(b) It was found that the element copper has two naturally-occurring isotopes.

Isotope	$^{63}_{29}Cu$	$^{65}_{29}Cu$
Abundance	69.2 %	30.8 %

Calculate the relative atomic mass of copper to two decimal places. [2]

Relative Mass = 69.2% of copper-63 + 30.8% of copper-65
= (0.692 × 63) + (0.308 × 65)
= 63.616
= 63.62 (2 d.p.)

22. The table shows the atomic structure of six unknown particles, represented by the letters **L** to **P**. The particles could be atoms or ions. [3]

particle	*electrons*	*protons*	*neutrons*
L	6	6	6
M	12	12	12
N	10	12	12
O	6	6	8
P	10	13	14

(a) Which two particles are an atom and an ion of the same element?

M & N

(b) Which two particles are isotopes of the same element?

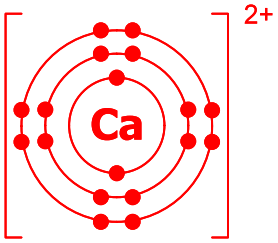
L & O

(c) Which particle has the highest atomic mass?

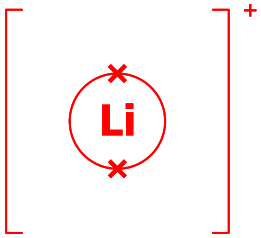
P

23. Draw a 'dot-and-cross' diagrams for [4]

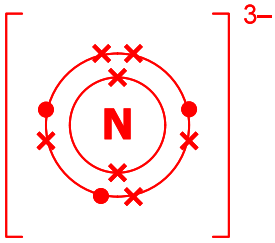
(a) a calcium ion (Ca^{2+}),



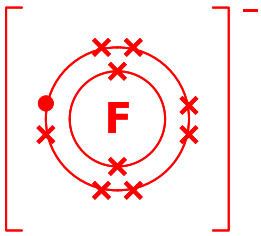
(b) a lithium ion (Li^{+}),



(c) a nitride ion (N^{3-}), and



(d) a fluoride ion (F^{-}).



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