



Anglo-Chinese School
(Barker Road)

A Methodist Institution
Founded in 1886

CHEMISTRY
DEPARTMENT OF SCIENCE

Name: _____ () 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
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11	12	13	14	15	16	17	18	19	20
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- The nucleus of an atom contains
 - protons only.
 - electrons and protons only.
 - protons and neutrons only.
 - neutrons only.
- The mass number of an atom or an ion can be calculated by
 - number of protons + electrons.
 - number of protons + nucleons.
 - number of electrons + neutrons.
 - number of nucleons.
- Which one of the following statements is **not** correct?
 - All hydrogen atoms contain one proton.
 - A proton has the same mass as a neutron.
 - An electron is 1840 times heavier than a proton.
 - A proton has the same but opposite charge as an electron.
- Which of the following statements is true for all neutral atoms?
 - number of protons = number of electrons
 - number of protons = number of neutrons
 - number of neutrons = number of electrons
 - number of neutrons = number of protons + electrons
- The element, symbol **E**, is written as ${}^Z_A\text{E}$. Which of the following is correct?
 - The number of neutrons in the nucleus is Z.
 - There are A electrons in the nucleus.
 - There are (Z – A) electrons surrounding the nucleus.
 - 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** $^{18}_{16}\text{S}$ **B** $^{32}_{16}\text{S}$ **C** $^{34}_{16}\text{S}$ **D** $^{18}_{34}\text{S}$
8. The number of neutrons present in an atom of manganese represented as $^{55}_{25}\text{Mn}$ is
- A** 25 **B** 30 **C** 55 **D** 75
9. The atoms $^{31}_{15}\text{P}$ and $^{32}_{16}\text{S}$ 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** $^{90}_{54}\text{X}$ **B** $^{144}_{54}\text{X}$ **C** $^{144}_{90}\text{X}$ **D** $^{234}_{90}\text{X}$
12. Which of the following atoms has fewer neutrons than protons in its nucleus?
- A** ^3_2He **B** ^7_3Li **C** ^9_4Be **D** $^{11}_5\text{B}$
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	$^{40}_{20}\text{Ca}^{2+}$	20	20	20
B	$^{19}_9\text{F}^-$	9	10	8
C	$^{18}_8\text{O}^{2-}$	10	8	12
D	$^{23}_{11}\text{Na}^+$	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. **C** loses two electrons.
B gains two protons. **D** loses two protons.

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

	<i>similarity</i>	<i>difference</i>
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, ^1H , ^2D and ^3T . 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]

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.....

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

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

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

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]

<i>particle</i>	<i>electrons</i>	<i>protons</i>	<i>neutrons</i>
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?

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

.....

(c) Which particle has the highest atomic mass?

.....

23. Draw a 'dot-and-cross' diagrams for

[4]

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

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

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

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

END