



Anglo-Chinese School
(Barker Road)

A Methodist Institution
Founded in 1886

CHEMISTRY DEPARTMENT OF SCIENCE

Name: _____ **ANSWERS** _____ () Class: SEC 3 _____

CHEMICAL FORMULAE & EQUATIONS – ASSIGNMENT

Multiple-Choice Questions [20 Marks]

TOTAL SCORE / 30

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

1 D	2 C	3 B	4 B	5 D	6 C	7 B	8 A	9 A	10 A
11 A	12 C	13 B	14 A	15 C	16 C	17 C	18 C	19 D	20 D

- Which of the following ions is **not** a molecular ion?
A ammonium ion **B** hydroxide ion **C** nitrate ion **D** sulfide ion
- Which of the following substances contains both covalent and ionic bonds?
A Al_2O_3 **B** $\text{C}_6\text{H}_{12}\text{O}_6$ **C** NH_4NO_3 **D** SiO_2
- In which of the following sets do all the compounds contain only ionic bonds?
A calcium oxide; carbon dioxide; magnesium oxide
B calcium oxide; magnesium oxide; sodium chloride
C carbon dioxide; copper(II) sulfate; hydrogen chloride
D copper(II) sulfate; hydrogen chloride; magnesium oxide
- What is the chemical formula for barium hydroxide?
A BaOH **B** $\text{Ba}(\text{OH})_2$ **C** BaOH_2 **D** $(\text{Ba})\text{OH}_3$
- What is the chemical formula for copper(II) nitrate?
A CuNO_3 **B** Cu_2NO_3 **C** Cu_3NO_2 **D** $\text{Cu}(\text{NO}_3)_2$
- What is the formula for diphosphorus pentaoxide?
A PO_4 **B** PO_5 **C** P_2O_5 **D** P_3O_4

7. What are the formulae for ammonia, carbon dioxide and methane?

	<u>ammonia</u>	<u>carbon dioxide</u>	<u>methane</u>
A	AH	CO ₂	MH ₄
B	NH ₃	CO ₂	CH ₄
C	NH ₄	C ₂ O ₂	MH ₄
D	A ₂ H	CO ₂	CH ₄

8. An unknown element **X** forms an ionic compound of the formula **X₂SO₄**. What is the formula for the ion of **X**?

- A** X⁺ **B** X²⁺ **C** X³⁺ **D** X⁴⁺

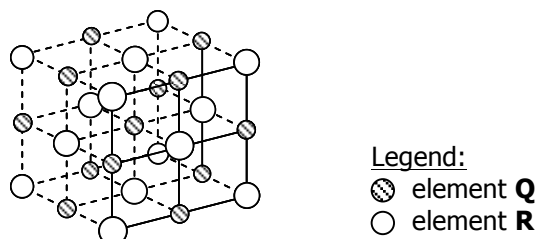
9. An unknown element **Y** forms a compound Al₂**Y**₃ with aluminium. What is the formula of the compound formed between **Y** and magnesium?

- A** Mg**Y** **B** Mg**Y**₂ **C** Mg**Y**₃ **D** Mg₂**Y**₃

10. What is the chemical formula for diamond and graphite?

	<u>diamond</u>	<u>graphite</u>
A	C	C
B	C	C ₆₀
C	C ₄	C
D	C ₄	C ₆₀

11. A portion of an ionic lattice is shown below.



What is the formula of this compound?

- A** QR **B** Q₂R **C** QR₄ **D** Q₁₃R₁₄

12. What is the number of electrons present in a carbonate ion?

- A** 28 **B** 30 **C** 32 **D** 36

13. Seven gaseous elements are listed below.

argon chlorine fluorine helium hydrogen nitrogen oxygen

How many of the above elements occur naturally as diatomic molecules?

- A** 4 **B** 5 **C** 6 **D** 7

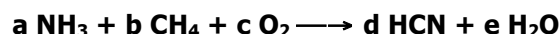
14. Several elements and their formulae are shown below. Which formula is **incorrect**?

- A** bromine, Br **B** iodine, I₂ **C** krypton, Kr **D** nitrogen, N₂

15. Several elements and their formulae are shown below. Which formula is **incorrect**?

- A** argon, Ar **B** hydrogen, H₂ **C** magnesium, Mg₂ **D** sodium, Na

16. A chemical equation is shown below:



Given that **a**, **b**, **c**, **d** and **e** are the smallest possible integer values for the equation to be balanced, what is the value of **e**?

- A** 2 **B** 4 **C** 6 **D** 7

17. A chemical equation is shown below:



Given that **a**, **b**, **c** and **d** are the smallest possible integer values for the equation to be balanced, what is the value of **b**?

- A** 6 **B** 7 **C** 13 **D** 15

18. Some iron fillings were burnt in the presence of oxygen, forming iron(III) oxide. Which of the following equations correctly represents this reaction?

- A** $2\ Fe + 3\ O \longrightarrow Fe_2O_3$
B $3\ Fe + O_2 \longrightarrow Fe_3O_2$
C $4\ Fe + 3\ O_2 \longrightarrow 2\ Fe_2O_3$
D $Fe_2 + O_3 \longrightarrow Fe_2O_3$

19. When solutions of barium chloride and lead(II) nitrate are mixed, a white precipitate of lead(II) chloride is formed, leaving a solution of barium nitrate as the byproduct. Which of the following equations correctly represents this reaction?

- A** $BaCl_2\ (l) + 2\ Pb(NO_3)_2\ (l) \longrightarrow 2\ PbCl_2\ (s) + Ba(NO_3)_2\ (l)$
B $BaCl_2\ (aq) + PbNO_3\ (s) \longrightarrow BaNO_3\ (s) + PbCl_2\ (s)$
C $Pb(NO_3)_2\ (aq) + 2\ BaCl_2\ (aq) \longrightarrow 2\ PbCl_2\ (s) + Ba(NO_3)_2\ (aq)$
D $Pb(NO_3)_2\ (aq) + BaCl_2\ (aq) \longrightarrow Ba(NO_3)_2\ (aq) + PbCl_2\ (s)$

20. Which of the following equations best represents water boiling?

- A** $2\ H_2O\ (l) \longrightarrow 2\ H_2\ (g) + O_2\ (g)$
B $H_2O\ (aq) \longrightarrow 2\ H\ (g) + O\ (g)$
C $H_2O\ (aq) \longrightarrow H_2O\ (g)$
D $H_2O\ (l) \longrightarrow H_2O\ (g)$

Structured Questions [10 Marks]

21. Construct balanced chemical equations, including state symbols, for the chemical reactions as described below. [10]

(a) Aluminium combines directly with chlorine to form aluminium chloride.



(b) Zinc metal reacts with dilute nitric acid to form aqueous zinc nitrate and hydrogen.



(c) Ammonia reacts oxygen to form nitrogen monoxide and water vapour.



(d) Hydrogen is produced when methane is reformed with steam. Carbon monoxide is a byproduct of this industrial process.



(e) Iron reacts with dilute silver nitrate, forming aqueous iron(II) nitrate and silver.



END