



Anglo-Chinese School
(Barker Road)

A Methodist Institution
Founded in 1886

CHEMISTRY
DEPARTMENT OF SCIENCE

Name: _____ () 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.

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11	12	13	14	15	16	17	18	19	20
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- 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⁺

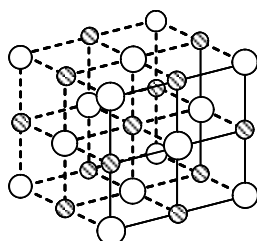
9. An unknown element **Y** forms a compound Al₂**Y**₃ with aluminium. What is the formula of the compound formed between **Y** and magnesium?

- 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.



Legend:
 ⊗ element **Q**
 ○ element **R**

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

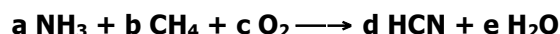
14. Several elements and their formulae are shown below. Which formula is **incorrect**?

- 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.

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

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(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.

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

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END