



Anglo-Chinese School  
(Barker Road)

A Methodist Institution  
Founded in 1886

CHEMISTRY  
DEPARTMENT OF SCIENCE

Name: \_\_\_\_\_ ( ) Class: SEC 4 \_\_\_\_\_

SIMPLE ELECTRIC CELL – ASSIGNMENT

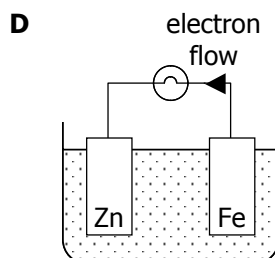
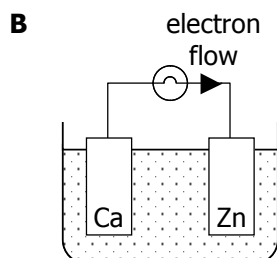
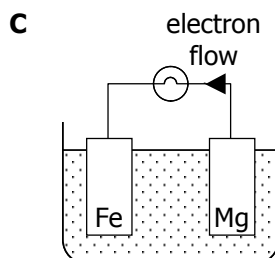
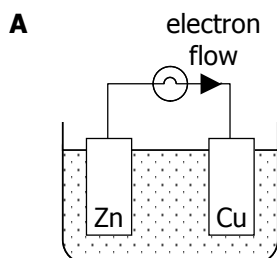
Multiple-Choice Questions [20 Marks]

TOTAL SCORE / 30

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

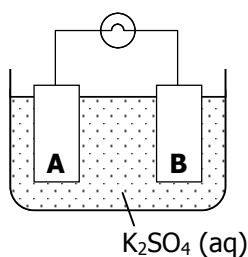
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1. An electric current flows in a copper wire as a result of
- A moving electrons and ions.                      C moving positive and negative ions.  
B moving electrons only.                            D moving protons only.
2. Below shows four simple electric cells, with the direction of electron flow indicated. Which of the following has the direction of electron flow **wrongly** indicated?



3. Electrical energy is produced by a simple cell as a result of
- A formation of covalent bonds between atoms.  
B formation of negative ions from atoms.  
C positive and negative ions coming together.  
D transfer of electrons from a more reactive to a less reactive element.

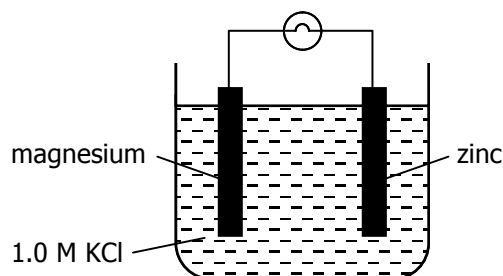
4. A simple electric cell as set-up as shown.



Which of the following pairs of metals would cause the bulb to light up the brightest?

	<i>Electrode A</i>	<i>Electrode B</i>
<b>A</b>	calcium	copper
<b>B</b>	calcium	magnesium
<b>C</b>	copper	silver
<b>D</b>	lead	magnesium

5. A simple electric cell is shown below.



Which of the following modifications to the set-up, each separately applied, will definitely cause the initial brightness of the bulb to increase?

- A** replace the electrolyte with 1.2 M KCl instead
- B** replace the magnesium electrode with calcium instead
- C** replace the magnesium electrode with copper instead
- D** replace the zinc electrode with calcium instead

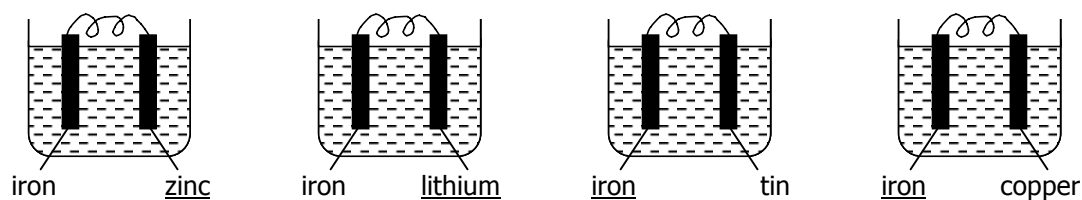
6. Which of the following statements about the operation of a simple electric cell is **false**?

- A** An example of a suitable electrolyte is dilute sulfuric acid.
- B** Platinum may be used as one of the electrodes.
- C** Reduction occurs at the cathode, and oxidation at the anode.
- D** The electrode which is more reactive forms the positive electrode.

7. Which of the following statements about the operation of a simple electric cell is **true**?

- A** A current is formed when positive charges flow from the cathode to the anode.
- B** Electrons flow from the less reactive metal to the more reactive metal.
- C** The more reactive metal has a tendency to increase in size.
- D** The negative electrode oxidizes to form positive ions.

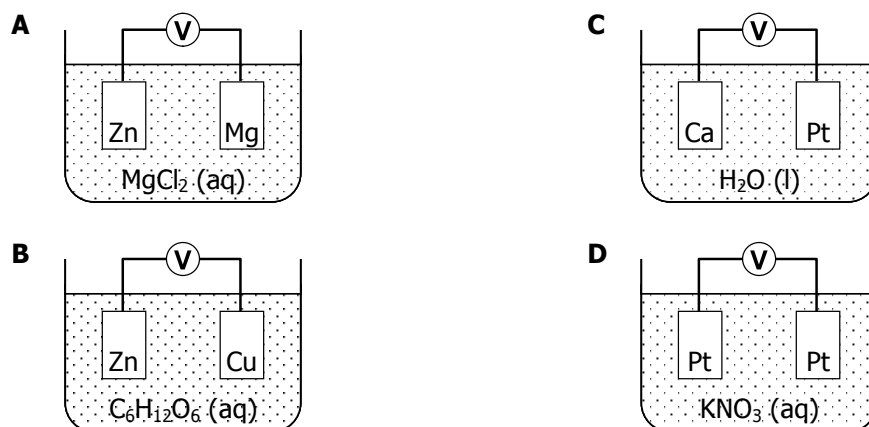
8. Four cells were set up using aqueous sodium chloride as the electrolyte as shown in the diagrams.



In each cell, only the underlined electrode dissolved. To establish the order of reactivity of the metals, it is necessary to set up two or more cells. Which of the following pairs of cells are needed in addition to the four cells above?

- |          | <i>first cell electrodes</i> | <i>second cell electrodes</i> |
|----------|------------------------------|-------------------------------|
| <b>A</b> | iron/iron                    | iron/zinc                     |
| <b>B</b> | tin/copper                   | lithium/zinc                  |
| <b>C</b> | tin/lithium                  | zinc/copper                   |
| <b>D</b> | tin/zinc                     | zinc/copper                   |

9. Four circuits were set-up as shown. In which circuit did the voltmeter register the largest magnitude of potential?



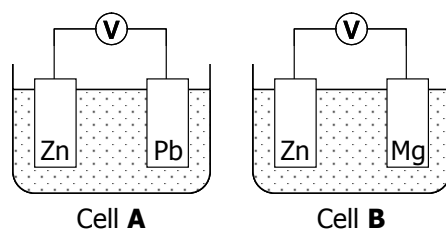
10. Which of the following is an accurate comparison of the redox reactions that occur in the cathode of a simple electric cell and a cathode of an electrolysis set-up?

- |          | <i>cathode in an electric cell</i> | <i>cathode in electrolysis</i> |
|----------|------------------------------------|--------------------------------|
| <b>A</b> | oxidation                          | oxidation                      |
| <b>B</b> | oxidation                          | reduction                      |
| <b>C</b> | reduction                          | oxidation                      |
| <b>D</b> | reduction                          | reduction                      |

11. Which of the following is an accurate comparison of the positive electrodes in a simple electric cell and the positive electrodes in an electrolysis set-up?

- |          | <i>positive electrode in an electric cell</i> | <i>positive electrode in electrolysis</i> |
|----------|---|---|
| <b>A</b> | anode   | anode                                     |
| <b>B</b> | anode   | cathode                                   |
| <b>C</b> | cathode                                       | anode                                     |
| <b>D</b> | cathode                                       | cathode                                   |

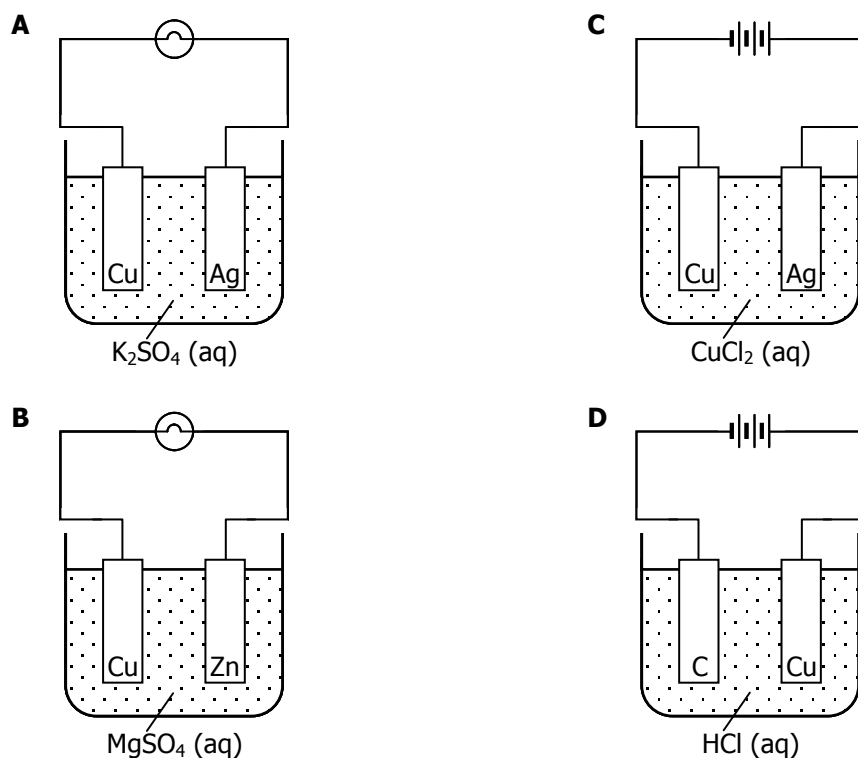
12. Observe the two simple electric cells below.



Which of the following statements describing the two cells is necessarily true?

- A** Cell **A** registers a larger voltage than Cell **B**.
- B** In both cells, bubbles of colourless gas would form.
- C** In both cells, the zinc electrode will dissolve.
- D** The direction of electron flow in both cells are different.

13. Four experimental set-ups are shown below. In which of the following did bubbles of colourless gas form around the copper electrode?



14. The potentials of several simple electric cells are as shown below.

Cell	Electrode 1	Electrode 2	Potential (V)
1	aluminium	magnesium	0.71
2	zinc	aluminium	0.90
3	magnesium	zinc	<b>x</b>

What is the value of **x**?

- A** - 1.61
- B** - 0.20
- C** 0.20
- D** 1.61

15. The potentials of several simple electric cells are as shown below.

Cell	Electrode 1	Electrode 2	Potential (V)
1	lead	chromium	0.61
2	zinc	iron	-0.32
3	iron	lead	-0.31
4	chromium	iron	<b>y</b>

What is the value of **y**?

- A** - 0.92                      **B** - 0.30                      **C** 0.02                      **D** 0.29

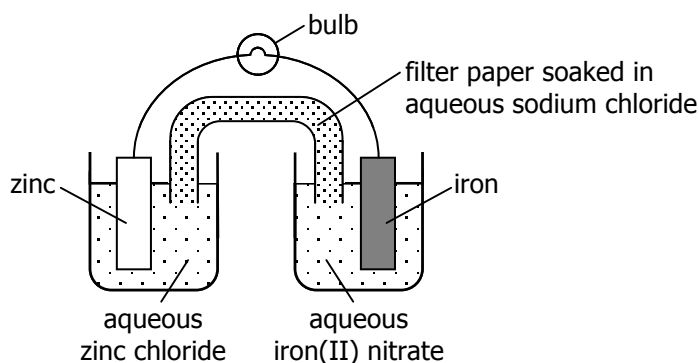
16. The potentials of several simple electric cells are as shown below.

Cell	Electrode 1	Electrode 2	Potential (V)
1	chromium	nickel	0.49
2	aluminium	cobalt	1.38
3	cobalt	chromium	-0.46

Arrange the four metals in increasing order of reactivity.

- A** cobalt, chromium, aluminium, nickel                      **C** nickel, chromium, cobalt, aluminium  
**B** cobalt, nickel, aluminium, chromium                      **D** nickel, cobalt, chromium, aluminium

17. The apparatus shown in the diagram was set up.

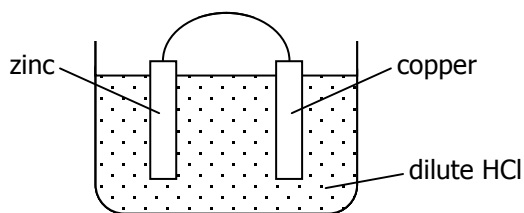


Which of the following observations would be seen?

- I Bubbles of colourless gas are formed around the zinc electrode.  
 II The aqueous iron(II) nitrate fades from green to colourless.  
 III The iron electrode decreases in size.

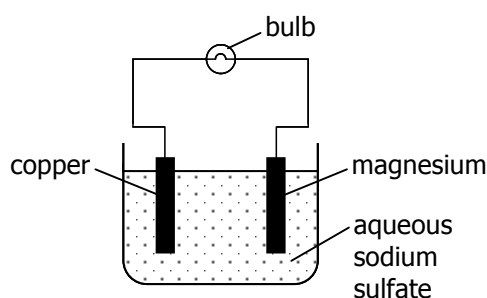
- A** II only                      **B** I and III only                      **C** I, II and III                      **D** none of the above

18. A piece of copper was joined to a piece of zinc by a wire and the apparatus set up as shown in the diagram below.



Which one of the following gases was evolved at the copper electrode?

- A** chlorine                      **B** hydrogen                      **C** oxygen                      **D** none
19. The apparatus shown in the diagram was set up.

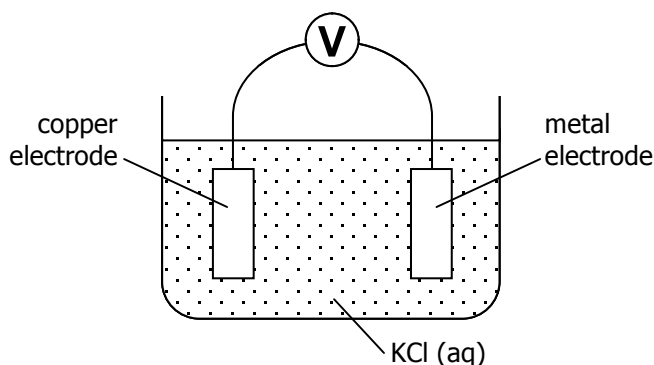


Which of the following did **not** occur?

- A** A gas was given off at the magnesium electrode.  
**B** A gas was given off at the copper electrode.  
**C** The magnesium electrode decreased in size.  
**D** The bulb lit.
20. Which of the following statements is an accurate **difference** between the hydrogen fuel cell and the simple electric cell?
- A** In a hydrogen fuel cell, a constant supply of fuel is needed.  
**B** In a hydrogen fuel cell, no electrolyte is necessary.  
**C** In a hydrogen fuel cell, oxidation occurs at the cathode instead.  
**D** In a hydrogen fuel cell, the negative terminal is the anode.

### Structured Questions [10 Marks]

21. The diagram represents a simple cell for the production of electrical energy. One electrode is copper and the other is one of copper, iron, magnesium, silver or zinc.



- (a) Complete the table with the metals – copper, iron, magnesium, silver or zinc. [1]

<b>meter</b>	<b>2.72 V</b>	<b>1.10 V</b>	<b>0.78 V</b>	<b>0.00 V</b>	<b>- 0.46 V</b>
<b>metal</b>					

- (b) Construct the half-equations for the positive and negative terminals when [3]

- (i) zinc is used as the electrode,

*Positive Terminal:* .....

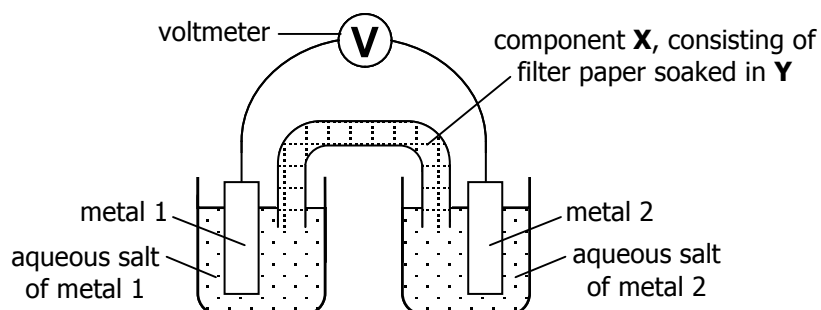
*Negative Terminal:* .....

- (ii) silver is used as the electrode.

*Positive Terminal:* .....

*Negative Terminal:* .....

22. An experimental set-up involving a simple electric cell is as shown. Different metals were used as the two electrodes, and the five different sets of potentials recorded in the table that follows.



metal 1	metal 2	potential (V)
aluminium	tin	1.52
copper	nickel	– 0.59
magnesium	nickel	2.12
chromium	copper	1.08
chromium	aluminium	– 0.92

(a) (i) State the name of component **X**. [1]

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(ii) Briefly describe the significance of component **X** to the entire set-up. [1]

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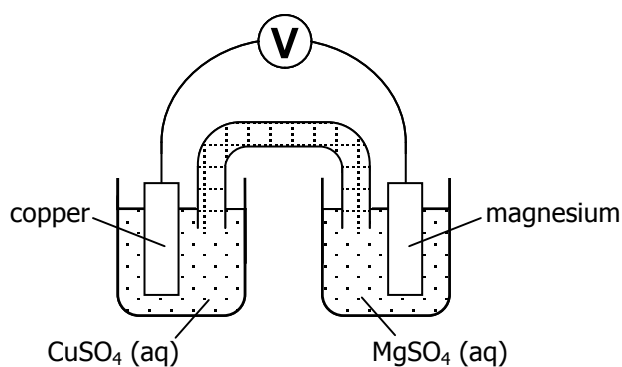
(iii) Suggest a suitable identity for substance **Y**. [1]

.....

(b) Arrange the six metals in decreasing order of reactivity. [1]

.....

(c) A sixth pair of metals, magnesium and copper, were connected in the same experimental set-up as shown below.



(i) In the diagram above, indicate the direction of the electron flow. [1]

(ii) Using the data from the table, calculate the voltage of this electric cell. [1]

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**END**