

## 9. CELLS AND SIMPLE CIRCUITS

1. Distinguish between a primary cell and a secondary cell.
2. Define the term "e.m.f" of a cell.
3. Distinguish between electromotive force and potential difference.
4. State one major difference between a primary cell and a secondary cell.
5. State the major difference between a dry cell and a wet cell.
6. State two advantages and one disadvantage of alkaline cells over lead acid accumulator.
7. Name two advantages which a lead accumulator has over a dry cell.
8. Give a reason why it is necessary to leave the caps of the cells open when charging an accumulator.

**Dry cells uses solid electrolyte while wet cells uses solution of an electrolyte.**

9. State the reason for topping up a lead acid accumulator with distilled water.

**The addition of distilled water into a lead acid accumulator to improve on the ion concentration.**

**Distilled water has been filtered to remove metals and minerals that may interfere with the process of the accumulator.**

10. Give a reason why it is not advisable to smoke a cigarette near a charging battery.
11. It is common practice that once an accumulator is recharged the terminals are connected using a wire so as to assess its state of charge. How is this dangerous to the life of the accumulator?
12. Recharging is one of the practices of maintenance of accumulators. State two measurements, which need to be taken to help you decide when an accumulator is due for charging.
13. State two qualities that are used to determine whether accumulator require charging or not.

**Density of the acid.**

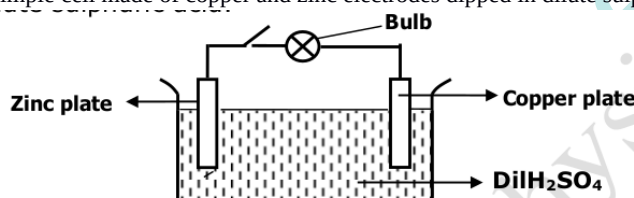
**E.M.F of the cell.**

**Level of the acid.**

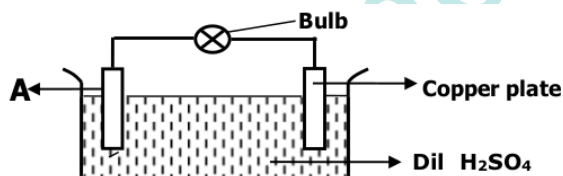
**E.m.f of the cell drops below 1.8 V**

**Relative density of the acid falls below 1.12 (using a hydrometer)**

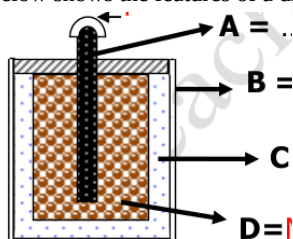
14. The figure below shows a simple cell made of copper and zinc electrodes dipped in dilute sulphuric acid.



- a) Identify the cathode and the anode.  
Cathode .....  
Anode .....
  - b) State the two common defects in a simple cell.
  - c) Explain how the defects in b) are minimized.
15. The figure below shows the set – up for a simple cell.



- (i) Name the electrode A.
  - (ii) Explain why the bulb goes off after only a short time.
16. Differentiate between local action and polarization as defects in a simple chemical cell.
  17. State how polarization is reduced in a dry cell.
  18. Explain how polarization affects the working of a simple cell.
  19. Distinguish between open and closed circuit.
  20. Draw a well labeled diagram of a dry cell.
  21. The figure below shows the features of a dry Leclanche cell.



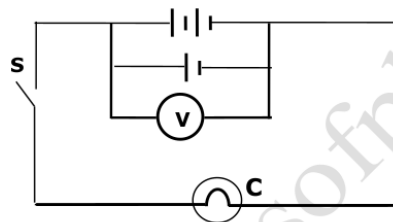
- i) Name parts A, B, C and D
  - (ii) Indicate on the same diagram the positive (+) and the negative (-) terminals.
22. State the use of manganese (IV) oxide in a dry cell.
  23. State two precautionary measures you would take to maintain the efficiency of an accumulator.
  24. State the advantage of Nickel-cadmium battery over the lead -acid type
  25. Give a reason why it is not advisable to arrange cells in parallel unless they have identical e.m.f .

**Cells should be arranged in parallel only when they have the same e.m.f otherwise one will drain the other.**

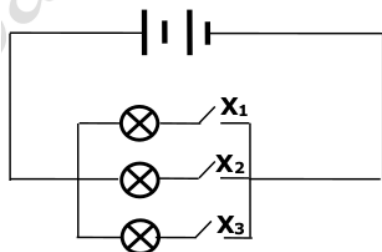
26. A form two student found his dry cells leaking on removing them from his torch. He asked his friend what could be the cause of this. What answer did his friend provide?

**The depolarizer manganese (IV) oxide has oxidized hydrogen gas produced during polarization to water.**

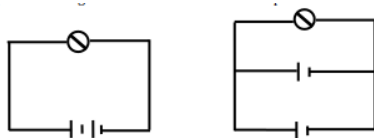
27. Figure below represents a simple circuit diagram containing cells of e.m.f 1.5 V each.



- (i) What does component C represent.  
 (ii) Determine the reading of V when the switch is open.
28. State the changes in brightness of the bulbs in the circuit diagram as the switches  $S_1$ ,  $S_2$  and  $S_3$  are switched on one after the other.



29. Fig (a) and (b) show two possible arrangements of a bulb to a source of power.



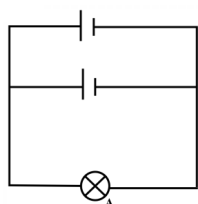
In which of the arrangement above would the cells drain faster. Explain your answer.

30. A battery is rated **120 AH**. How long will it work if it steadily supplies a current of **4 A**. **ANS 30 hours**  
 31. Calculate the amount of current flowing through a bulb if **720 C** of charges flow through it in **200** seconds. **ANS 3 A**  
 32. Calculate the amount of current flowing through a bulb if **300 C** of charges flow through it in **2.5** minutes. **ANS 2 A**  
 33. Find the time takes for a charge of **960 C** to pass through a conductor where a current of **4 A** is flowing. **ANS 240 s**  
 34. If **180 C** of charge flows through a circuit in one minute. Find the current through the circuit. **ANS 3 A**  
 35. Calculate the amount of charge passing through a point in a circuit if a current of **5 A** flows for **1.5** minutes. **ANS 450 C**  
 36. A current of **4.8 A** was passed through an electrolyte for  $\frac{1}{2}$  hours. Calculate the quantity of electricity used. **ANS 144 C**  
 37. A charge of magnitude **1200 C** flows through a point in **15** minutes. Calculate the current. **ANS 1.333 A**  
 38. A current of **0.5 A** flows in a circuit. Determine the quantity of charge that crosses a point in **4** minutes. **ANS 120 C**  
 39. A current of **2 A** passes through bulb Q for **2** minutes **30** seconds. Determine the quantity of charge through Q. **ANS 300 C**  
 40. A charge of magnitude  $12 \times 10^3 C$  flows through a point in **15** minutes. Calculate the current. **ANS 13.33 A**

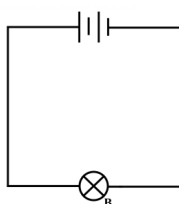
#### RANDOM QUESTIONS

1. In a simple cell, the zinc plate gets negatively charged and the copper plate gets positively charged.
- (a) Name the electrolyte in the cell. (1 Mark)  
**Dilute sulphuric acid.**
- (b) Explain how: (1 Mark)  
 (I) Zinc gets negatively charged. (1 Mark)  
**Zinc ions go into acid leaving electrons on the plate.**  
 (II) Copper gets positively charged. (1 Mark)  
**Give up electrons to discharge hydrogen Ions.**
- (c) State what constitutes the current when a wire is used to connect the zinc plate and the copper plate externally.  
**Electrons flow from zinc plate to the copper plate.**

2. Figures (a) and (b) below show two circuit diagrams with identical lamps and identical cells.



(a)



(b)

State with a reason which of the bulbs will be brighter.

(2 Marks)

**Bulb B. This is because cells connected in series have higher e.m.f and current flowing in the circuit than the cells connected in parallel.**