

**IGCSE CHEMISTRY P2V4
KEY**

Objective Portion

Marks: 25

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

Subjective Portion**Marks: 45****Q1:****(a)****(i)**

- Cathode: Gains mass as copper ions reduce.
- Anode: Loses mass as copper atoms dissolve.

(ii) Copper sulfate solution conducts electricity via Cu^{2+} and SO_4^{2-} ions.**(b)**

- Cathode: Produces H_2 from H^+ ions.
- Anode: Produces O_2 from OH^- ions.

A flame test for hydrogen and rekindling a glowing splint for oxygen are used. PH indicators detect pH changes from hydroxide ions.

Q2:**(a)**

(i) Electrolysis refers to using electricity to drive non-spontaneous chemical reactions in an electrolytic cell.

(ii) Damp blue litmus paper is used, which will turn white or bleached if exposed to chlorine gas, confirming the presence of chlorine gas.

(iii) Polyvinyl chloride (PVC)

Q3:**(a)**

(i) Cathode: copper ions gain electrons to form solid copper.

Anode: copper atoms lose electrons, becoming copper ions that dissolve.

(ii) By dissociating into ions (Cu^{2+} and SO_4^{2-}) when dissolved in water.

(b) In sodium sulfate solution, hydrogen forms at the cathode, and oxygen forms at the anode. Hydrogen ignites with a "pop," while oxygen relights a glowing splint.

Q4:

(a) J, K, and L are the electrolytes.

(b) Graphite.

Practical Portion

Marks: 30

Q1:

(a) Due to the reaction of carbon dioxide with lime water to form insoluble calcium carbonate, appears as bubbles.

(b) Lack of carbon dioxide production.

Q2:

(a) Clean wire ensures pure flame color.

(b) Formation of bubbles or effervescence.

(c) Instrumental methods faster, less chemicals.

Q3:

Flame tests:

- Beaker 1: Yellow flame (sodium ions)
- Beaker 2: Violet flame (iodide ions)
- Beakers 3 and 4: No specific flame color

Add dilute nitric acid to beakers 3 and 4: Effervescence (carbonate ions)

Add silver nitrate solution:

- Beaker 1: White precipitates (chloride ions)
- Beaker 2: Yellow precipitate (iodide ions)

Conclusions:

- Beaker 1: Sodium chloride
- Beaker 2: Sodium iodide
- Beaker 3: Sodium carbonate
- Beaker 4: Potassium carbonate

Q4:

Because aluminum ions gain electrons at the cathode, leading to the deposition of aluminum metal.