**Unit 1-2 Chemistry SAC task : Critique of an experiment design**

**Title:** Critique of a galvanic cell

**Background**

A galvanic cell is a device used to power an appliance. For a cell to be commercially useful, the manufacture usually seeks to maximise the voltage and efficiency of the cell. As chemistry students, you have understandings of redox principles that you can apply to ensure the cell performance is satisfactory. You also have an awareness of how the differences in reactivity of metals is relevant to cell voltage,

**Task**

In this experiment you will set-up a galvanic cell and record the voltage it produces. The teacher will deliberately provide you with materials that will lead to a cell that performs poorly and does not produce a useful voltage.

You are asked to

* set this cell up and to record its voltage
* then critique the cell, making recommendations as to how to improve the performance of the cell
* justify the changes you are recommending
* set-up a redesigned cell that incorporates some of your suggested changes.

**Materials**

Voltmeter

Electrical leads

0.5 M KNO3 for the salt bridge

Zinc electrode

Iron electrode

* 1. M Zn(NO3)2

0.1 M Fe(NO3)2

**Diagram

Description automatically generatedProcedure**

Set up the cell shown

Record the voltage

**Design changes**

Consider each facet of this cell. Changes can be made to improve the voltage obtained.

List possible changes.

For each suggested change, explain why you are anticipating a better performance from the cell.

Set the cell up again, instituting some of your suggested changes.

Record the voltage obtained.

What conclusion can you draw on the changes you have made?

**Report**

You need to submit a report on this task. Your report will include –

* the voltage you obtained from the initial cell
* analysis of this cell, the half-equations occurring, the direction of electron flow and the polarity of the electrodes.
* each proposed change and the explanation of why you have suggested that change
* the voltage you obtained from the second cell
* the conclusion you have made about the effectiveness of your changes.

**Possible marking scheme**

Voltage and polarity recorded from the initial cell 2 marks

Analysis of the cell, half-equations, electron flow, polarity 4 marks

Four suggested changes and the justification 4 marks for each change

Voltage from redesigned cell 2 marks

Conclusion 6 marks

Total 30 marks