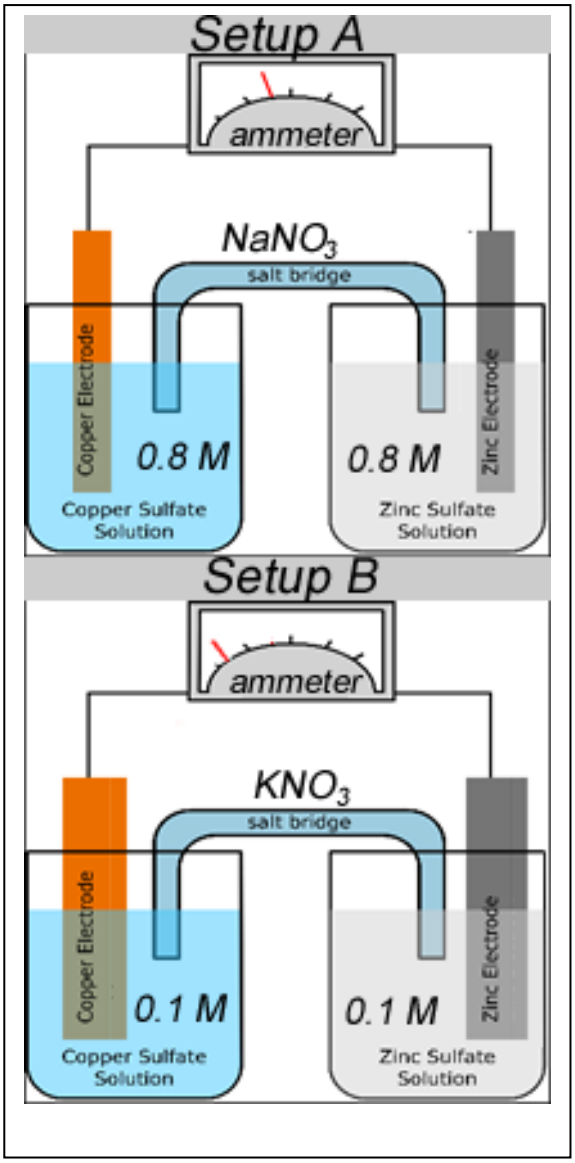
Friday Worksheet **Name: …….**

Experimental technique worksheet 1

1) A student wanted to see if increasing the concentration of the half-cell solutions increased the current created by a galvanic cell.
The student set up the two galvanic cells shown on the right.
The student concluded that higher concentrations do indeed increase the amount of current produced.



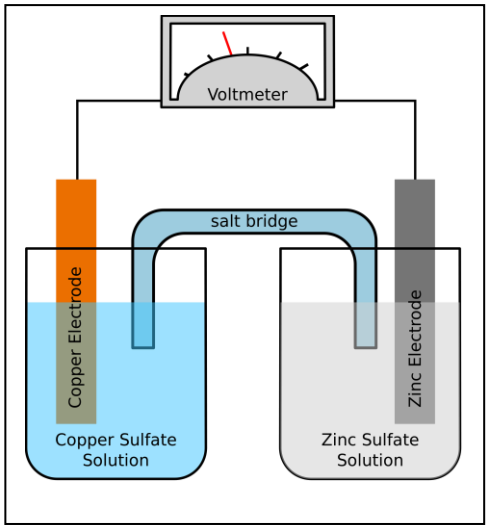
a) The student's conclusion is not valid because the experimental design is flawed.
Critically review the student's experimental design.
In your response, you should:
• identify and explain **three** improvements or modifications that you would make to the experimental design
- The salt bridge should be the same for both setups.
- The surface area of the electrodes should also be the same.
- Repeat the experiment more than once to gain consistent results.

• discuss the experimental outcomes you would expect regarding the effect of different concentrations and surface area of electrodes on current output . Justify your expectations in terms of chemical ideas you have studied this year.
Current is the flow of charge and increasing surface area increases the number of e- that can flow at any time.

Increase in concentration should increase the current flowing. High concentrations mean higher rates of reaction and hence more electrons per unit time should be produced at the anode through oxidation.

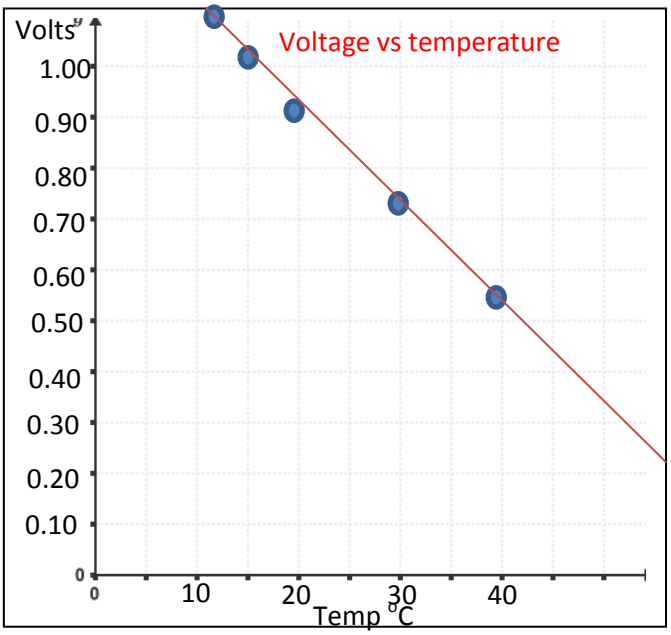
Greater surface area of electrodes should also increase the number of fruitful collisions per unit time and hence cause a greater current.
Voltage is only affected by concentration and the distance between reduction potentials.

2) A student used the galvanic cell shown on the right to see what effect temperature has on the voltage of this cell. Below are the student's results .



Temperature (^{o}C)	Volts
12	1.11
15	1.00
20	0.90
30	0.73
40	0.55

a) Graph the results on the set of axis below. Clearly label all axis and provide a title.



Graph includes :
- line of best fit
- labelled axis
- heading
-Dependent variable represented by the y-axis
- Independent variable represented by the x-axis.

b) Outline an experimental procedure that the student should follow to obtain valid results.

In the procedure students must state the following. As the temperature of the galvanic cell increases:
- electrodes remain identical in each half cell,
- concentration of each half cell solution remains constant.
- distance between the electrodes remains constant as does the voltmeter.

c) In your procedure in b) above what is the:

I. dependent variable, voltage

II. Independent variable. temperature

a. The following statements were found written in a student's diary.

i. *"The voltage should increase with an increase in temperature due to a greater rate of collisions"* *Hypothesis*

ii. *"Measure the change in voltage as temperature increases"* *Aim*

iii. *"Voltage of the cell decreased as temperature increased"* *Observation*

iv. *“Both electrodes were 2.0 cm wide, 7.0 cm long and 0.20 cm in depth”*

Procedure

Which comment above can be considered to be

- a hypothesis, the aim, part of the procedure, observation.