Preparing for science practical assessments

Risk Assessment	Hazard	Risk (how)	Control
	Corrosive Liquids/ irritants.	Spillage when pouring/ splashes.	goggles to protect eyes or gloves to protect skin.
	Glassware can break and lead to cuts.	Glassware can break if dropped or toppled over and can cut skin.	Handle with care. If it breaks then deal with it carefully!!
	Hot glass and liquids.	Can lead to burns if touched when hot	Use test tube holder or wait until apparatus has cooled

Precision	More increments. More precision can lead to improved accuracy. e.g. Digital thermometer with 0.1 increments/divisions.
Accuracy	Remove error. Precision helps. “true value”
Repeatable	Do it again. Similar results obtained each time with same pattern.
Reproducible	Repeating the experiment whilst changing the method or comparison with others show the same trend/pattern.
Continuous Variables	Usually **numbers**. e.g. Temperature, Mass, Height
Dependent Variable	Usually thing that is **recorded** in an experiment and the variable being affected by the independent variable.
Independent Variable	The thing you **change** in an experiment.
Control Variable	Things you keep the same. “amount” is **NOT** sufficient **USE** “same mass of ….” (solid), “same volume of …” (liquid)
Anomalous Result	A result that doesn’t fit in with the rest of the results. This data is usually circled to indicate its presence. Ignored in the calculation of a mean and when drawing a line of best fit.
Mean	The **average** of a set of results. It is calculated by adding together the results and dividing by the total number of results. Any anomalies (odd results) should be ignored!
Range	The **spread** of data. It is calculated by subtracting the smallest result from the largest result. Include **units**.
Scatter Graph	Also referred to as line graphs. This is used when both variables are **continuous** (numbers). If a pattern is seen then a line of **best fit** can be drawn to show the relationship. This can be a straight line or curve depending on the **pattern**. (SALUTE)
Line Graph	A graph that plots data from **continuous** variables
Line of best fit	A line on a graph which passes through or as near to as many points as possible. (Straight line or smooth curve depending on trend)
Conclusion	A **summary** of what you have found after analysing your data. Use data from your graph. e.g. as “…i.v.…” increased/decreased from ….. to ….. the “…..d.v.……” increased/decreased. Include units when stating values.
Evaluate	How can you improve the experiment? Can you trust/improve your results?
Solubility	The mass of solute that can dissolve in water. Usually in g/100g

Research: Solubility

1. Add substance to a known volume of water until no more dissolves.
    - The temperature can be changed.
2. Use a known amount of substance (excess) in a small volume of water.
    - Dissolve by heating and record the temperature for recrystallisation.
    - Repeat by adding more water to change its solubility g/100g.
3. Add excess of substance (poor solubility). Find out how much did not dissolve.

Recording data

- **A standard table for results**

Independent Variable, units	***Dependent Variable, units***

OR

i.v.		
d.v		

Include the mean in the dependent variables heading with units!

- **A combined table with example data:**

i.v.	**d.v. units**			
	trial 1	**trial 2**	**trial 3**	**mean**
	6.5	**6.4**	**7.1**	

The number of columns depends on the number of trials.

1. Which result is an anomaly? Trial - 3 (7.1)

- **Explain It has a higher value than trial 1 and 2.**

2. Work out the mean of the values above (6.5+6.4)/2 = 6.45

3. If 2g of lead nitrate dissolves in 12g of water calculate the solubility using the following equation: 2/.012= 167

$$Solubility = \frac{Mass\ of\ solute}{(mass\ of\ water/1000)}$$

Note:

1g water = 1 cm³ = 1ml

3. Create a table to show how solubility changes with temperature for the following information:

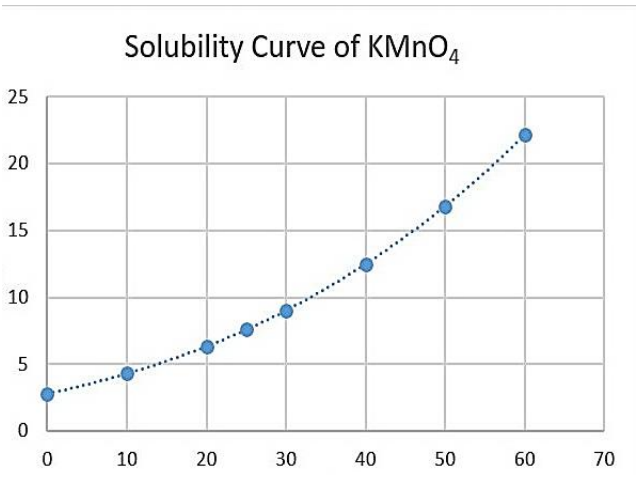
Volume of Water, cm^3	Temperature, °C	Solubility, g/100g
4	80	500
6	72	333
8	47	250
10	33	200
12	25	167

4 cm^3 water, 2g potassium chlorate crystallises at 80 deg C

add 2 cm^3water 72; +2 $cm^3$47; +2 cm^3 33; 2 cm^3 25

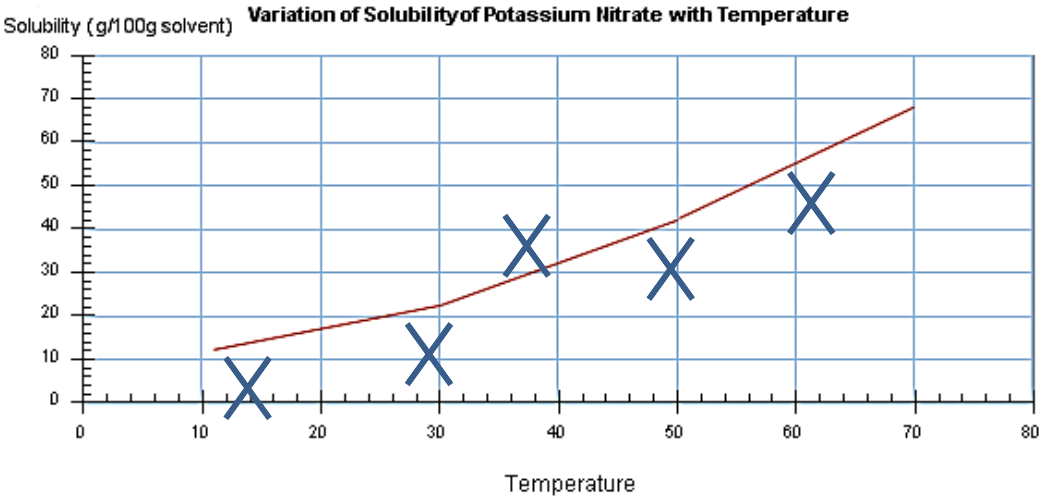
A. What is missing/incorrect in the following graphs?

S – Scale
A- Axes
L – Line/ Label
U- Units
T – Title
E – Equal Spacing

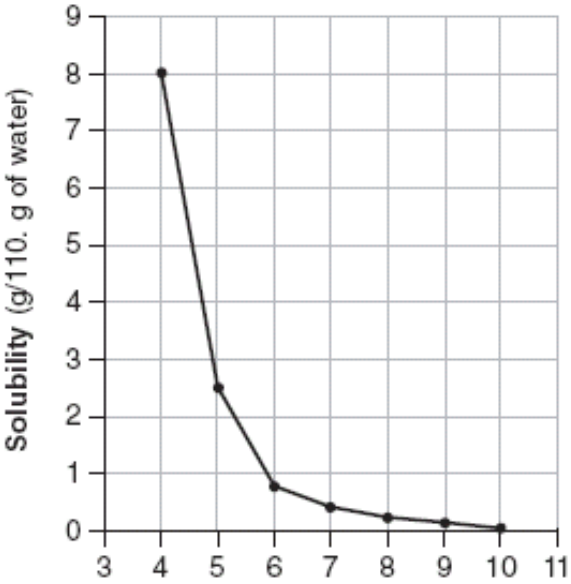


1. a) Using the graph describe the effect of changing temperature on solubility of $KMnO_4$?
As the temperature increase from 10°C to 60°C the solubility increased from 4 to 23 g/100g

2)b) Complete the graph (1) Label with units!



2. What is missing?
UNITS - °C (1)



3. How can this graph be improved? (1)

Smooth best fit curve

a) State the independent variable. (1) Temperature

(NOT **TEMP**)

b) State the dependent variable. (1) Solubility of "…."

4. Watch the following video and describe how you will do this experiment.

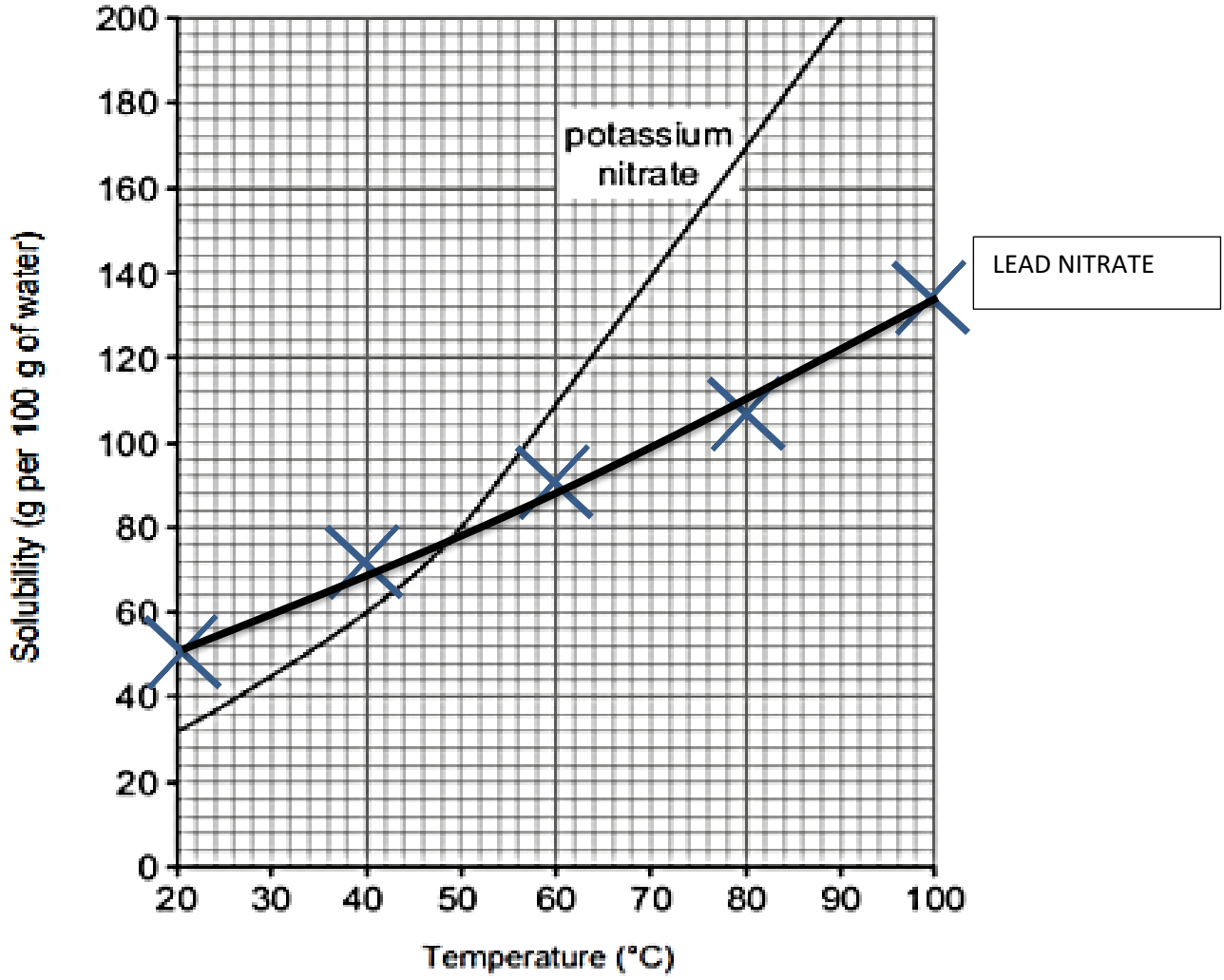
https://www.youtube.com/watch?v=XwA2m1fsXf4

a) What is added each time? Water – this changes the solubility (g/ 100g)

b) What is being recorded? The temperature

c) When is it recorded? when crystals start forming

The graph shows the solubility curve of potassium nitrate.



(a) The table shows the solubility of lead nitrate at different temperatures.

Temperature (°C)	20	40	60	80	100
Solubility of lead nitrate (g per 100 g of water)	52	72	90	112	136

(i) Plot the solubility of lead nitrate on the grid above. [3]

(ii) Using the graphs, compare the solubilities of potassium nitrate and lead nitrate between 20 °C and 100 °C. [3]

From 20°C to 48°C lead nitrate is more soluble than potassium nitrate. At 48°C they have the same solubility but at higher temperatures potassium nitrate is more soluble.