Basic practical competencies answer sheet

Basic practical competencies

Laboratory equipment

1. For each part (a)–(e) give ½ mark for the correct name and ½ mark for one or more correct possible volumes depending on what is available in your laboratory.

a) conical flask
100 cm^3 / 250 cm^3

b) beaker
100 cm^3 / 250 cm^3

c) volumetric flask
100 cm^3 / 200 cm^3 / 250 cm^3

d) test tube *or* boiling tube
10 cm^3 *or* 25 cm^3

e) burette
50 cm^3

f) pipette
various sizes although 20 cm^3 or 25 cm^3 are the most common at school level

2.

a) (gas) syringe *(1 mark)*

b) evaporating basin*(1 mark)*

c) crucible *(1 mark)*

d) pestle and mortar (the mortar is the bowl) *(1 mark)*

Recording results

1. Improvements: *(1 mark for each improvement identified)*

- Units for temperature should be included in the table headings.
- All results should be recorded to the same number of decimal places (the resolution of the thermometer used), in this case 1 d.p.
- The temperature changes are negative and so should be recorded as such, eg –22.1, or the heading should be changed to 'Temperature decrease' or similar.
- The temperature change for Run 3 is anomalous and so should be circled, or similar, to show this. It is correctly not included in the calculation of the mean.
- The mean temperature change should be stated to the same number of significant figures as the values from which it is calculated.

2. Experiment 1: (2 marks)

	Mass / g
Crucible empty	
Crucible + magnesium ribbon	
Crucible + magnesium oxide	

1 mark – Units given in table heading
1 mark – Clear description of item of which the mass is being recorded
Use teacher discretion to award marks for other suitable tables

Experiment 2: (3 marks)

Time / s	**Volume of hydrogen gas produced / cm^3**		
	0.5 mol dm^{-3} HCl(aq)	1.0 mol dm^{-3} HCl(aq)	1.5 mol dm^{-3} HCl(aq)
0			
20			
40			
60			
80			
100			
120			
140			
160			
180			

1 mark – Columns clearly labelled with units
1 mark – Dependent variable (volume of hydrogen gas) across columns
Independent variable (time) down rows
1 mark – Time starts at 0 and is in seconds throughout table (ie not 1 min 20 s)

Drawing scatter graphs

1. Graph plotted with marks allocated as follows:

- Temperature on the *x*-axis, volume on the *y*-axis. (1 mark)
- Suitable scales are chosen so that the plotted points cover more than half the graph paper (ie axes do not start at 0). (1 mark)
- Axes labelled with value and unit. (1 mark)
- Points are plotted accurately with a neat pencil cross and within ±1 square.
  All points plotted accurately 3 marks
  4 points plotted accurately 2 marks
  3 points plotted accurately 1 mark

2. Error bars are added to each plotted point (except 80 °C, 51.0 cm^3) (1 mark)
Anomalous values circled in table not included in error bars (1 mark)

3. Suitable line of best fit drawn (1 mark)

4. As the temperature increases the volume of the gas increases (or suitable similar comparative statement) (1 mark)