SCORING SCHEME

Hotline: 0776/0754958643

SCORING GRID

Basis of assessment	Scoring criteria			
	Evidence/skills/ability exhibited [Justification]	**Code**	**Score/collection [Max.score]**	**Total score**
Title	Gives the title of the experiment, indicating the variables. **01**	a	1a	30
Aim	Provides the aim of the experiment **01**	b	1b	
Hypothesis	States the hypothesis, either null or alternative; indicating both variables **02**	c	1c	
Variables	States the variables; ✓ Independent **01** ✓ Dependent **01** ✓ Controlled. **03**	d	3d	
Apparatus/materials	Lists requirements **04**	e	2e	
Procedure(s)	Outlines a procedure; ✓ Relevant to the experiment. **04** ✓ Coherent to the experiment. **04** Identifies risks **02** Manages the controlled variables. **02**	f	10f	
Results/ presentation of data	Presents accurate/correct data logically [table] **03**	g	3g	

SCORING GUIDE

(a) **Title:** Investigation of the effect of surface area(particle size) on the rate of reaction between P_1, P_2 and solution Q[a]

(b) **Aim:** To determine if P_2 reacts faster with solution Q than P_1[b]

(a) **Variables:**

Manipulated variable: Surface area (particle size) of P_1 and P_2[d]

Responding variable: Loss/decrease in mass of the reaction mixture[d].

Controlled variables: Mass of sample $P_1$and P_2[d], concentration/volume of solution Q[d].

(b) **Hypothesis:** The larger the surface area of the limestone[c], the faster the decrease/loss in mass of the reaction mixture[c].

(c) **Apparatus and materials**

- Solid sample P_1 and P_2[e], solution Q[e], measuring cylinder ($50cm^3$)[e], a conical flask/beaker[e], stop clock[e], weighing scale[e], distilled water[e], cotton wool[e].

(d) **Procedure**

(i) A clean conical flask was put on a weighing scale and its weight/mass, M_O was recorded[f].

(ii) $25cm^3/30cm^3$ of solution Q was measured (and transferred) into a clean conical flask[f] while still on the weighing scale using a measuring cylinder[f].

(iii) 5g of P_1 was accurately weighed and added to solution Q, a plug of cotton wool was placed in the neck of the flask[f] and the new(initial) mass, M_1 (of the flask and reaction mixture) was recorded[f]. Immediately a stop clock was started[f].

(iv) The mass of the conical flask and reaction mixture(apparatus) was recorded every after 1 minute for 7 minutes[f].

(v) The (total) loss/decrease in mass of the reaction mixture(apparatus) was calculated for each recording of the weighing scale/balance by the formula $M_1 - M_0$[f]

(vi) After 7 minutes, the conical flask was emptied and cleaned[f].

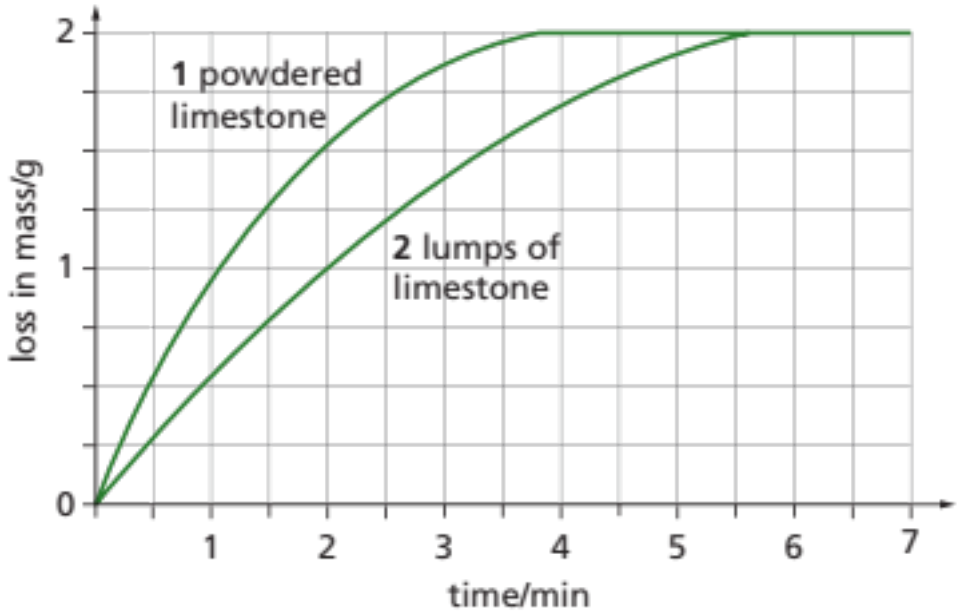
(vii) Steps (ii) to (vi) were repeated using solid sample P_2[f]

(e) Results/Data presentation

Time(minutes)		0	1	2	3	4	5	6	7
Loss in mass reaction mixture(g)	P_1	0[g]	0.55[g]	1[g]	1.38[g]	1.75[g]	1.90[g]	2.0[g]	2.0[g]
	P_2	0[g]	1[g]	1.5[g]	1.88	2.0[g]	2.0[g]	2.0[g]	2.0[g]

(f) **Analysis/discussion**

A graph of time for loss in mass of reactants against time



Explanation/interpretation

- The loss in mass of P_2 increased very rapidly upto 4th minute and then remained constant [h] but that for P_1 increased rapidly upto 5.5/6th minute and then remained constant [h]. This is because P_2 has smaller particle size than P_1 thus, a larger surface area of P_2 particles is exposed to solution Q molecules [h], increasing the frequency of collision between reacting molecules/particles thereby increasing the rate of reaction [h]. Thus, the larger the surface area of solid reactants, the faster the rate of reaction [h].
  ACC: Earlier maximum and later maximum attained for P_2 and P_1 respectively.
  ACC: Rate of reaction was faster with P_2 than P_1, because P_2 being with smaller particle size, had a larger surface area than P_1 which increased the frequency of collision between reacting molecules, leading to faster rate of reaction.

(g) **Conclusion**

- P_2 reacts faster with solution Q than P_1 [i] since it has increased/a larger surface area [i] exposed to solution Q than P_1 [i].

(h) **Recommendation**

Mr. Okiror [j] should use sample P_2 of limestone [j] for faster neutralization of soil acidity [j].