

Solutions

2.1 $0.48 \div 60 = 0.008 \text{ g/s}$.

2.2 Powder has a larger surface-area-to-volume ratio; more particles are exposed to the acid, so collisions are more frequent.

2.3 It lowers the activation energy – a lower hump; the overall energy change is unchanged.

3.1 At 60°C particles have more kinetic energy; they collide more frequently; and a greater proportion of collisions exceeds the activation energy; both effects raise the successful-collision rate, so the reaction is faster.

3.2 Time how long a cross beneath the flask takes to disappear – the cloudier it gets, the faster the reaction. Controls: same concentration/volume of both solutions; same temperature/flask, same observer distance and lighting.

3.3 Curve rising steeply then flattening to a plateau; draw a tangent touching the curve at 30 s; the gradient of the tangent = change in quantity $\div$ change in time along it, giving the rate at 30 s.