

Solutions

2.1 A A product-time graph has a steeper gradient where rate is larger. A tangent estimates instantaneous rate; a secant gives average rate over an interval. The final plateau reflects the total collected product under the stated conditions.

2.2 average rate=volume/time= $24/40=0.60\text{ cm}^3/\text{s}$.

2.3 False. A catalyst does not change the equilibrium constant at a fixed temperature. A mass-loss method cannot detect all reactions, and losing gas through a leak biases a collection experiment.

2.4 activation energy. activation energy means The energy barrier for a reaction pathway.

3.1 0.90 then $0.30\text{ cm}^3/\text{s}$; overall 0.60. A secant does not in general give the tangent at 20s. More closely spaced data are needed for the instantaneous estimate.