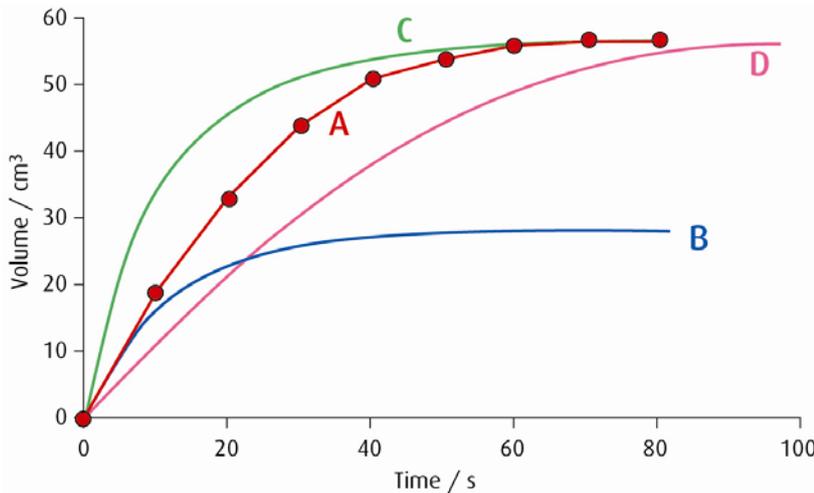## Marking scheme for Core Worksheet – Chapter 6

1   a   gas collection method, e.g. gas syringe or gas burette/measuring cylinder filled
          with water   [1]

          rest of apparatus: flask/boiling tube with bung, delivery tube   [1]

     b

          all points correctly plotted   [1]
          line of best fit drawn   [1]

     c   gradient steepest therefore rate fastest at the beginning   [1]
          concentration of HCl highest at the beginning   [1]
          most successful collisions in a certain time   [1]
          gradient decreases therefore rate decreases as time goes on   [1]
          HCl used up/concentration decreases   [1]

     d   same initial rate   [1]
          half volume of CO_2 collected   [1]

     e   faster initial rate – steeper at beginning   [1]
          same final volume of CO_2 [1]

     f   slower initial rate   [1]
          same final volume of CO_2 [1]

2   another curve drawn lower with maximum more to the right to represent higher temperature [1]

     activation energy drawn on graph   [1]

     areas above activation energy shaded   [1]

     at higher temperature, more particles have energy greater than or equal to the activation
     energy   [1]

     greater chance that a collision will be successful, therefore more successful collisions in a
     certain time   [1]

     particles have more kinetic energy at higher temperature   [1]

     collision frequency increases, but this is a minor effect   [1]

3   **a** $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$ [1]

     b   Either measure the volume of gas at time intervals or measure the change of mass at time intervals. [1]

     c   a substance that speeds up a chemical reaction [1]

   but is unchanged at the end of the reaction [1]

     d
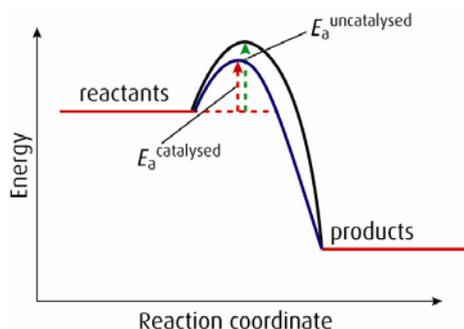
         catalyst provides an alternative pathway [1]

         with lower activation energy [1]

         greater proportion of collisions successful [1]

         graph showing products at lower energy than reactants [1]

         activation energies marked [1]

         activation energy for catalysed reaction lower than for uncatalysed [1]

4   **a**

Temperature / °C	Time / s	1/time ($\propto$ rate) / s^{-1}
21	151	0.00662
28	104	**0.00962**
37	66	**0.0152**
46	34	**0.0294**
50	27	**0.0370**
61	15	0.067

         all entries correct for 2 marks; lose 1 mark for each mistake [2]

b
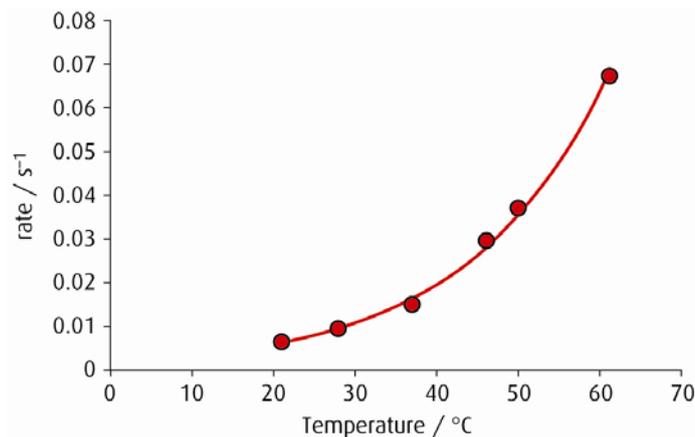
all points correctly plotted for 2 marks, lose 1 mark for each mistake [2]

line of best fit drawn [1]

c

Temperature / °C	1/time ($\propto$ rate) / s^{-1}
21	0.00662
31	**0.012**
41	**0.021**
51	**0.038**
61	0.067

all entries correct for 2 marks; lose 1 mark for each mistake [2]

from 21 °C to 31 °C the rate increases by a factor of 1.81 times
from 31 °C to 41 °C the rate increases by a factor of 1.75 times
from 41 °C to 51 °C the rate increases by a factor of 1.81 times
from 51 °C to 61 °C the rate increases by a factor of 1.76, or similar analysis [1]

within this temperature range, the rate increases by a factor of about 1.8 for each
10 °C rise in temperature [1]

statement does not hold **exactly** in this case / statement is **approximately true** in this
case (with suitable justification) [1]