IB Chemistry: Data & Graphing. Name: Answer Key

Oxygen can be generated by the reaction of Hydrogen Peroxide with Manganese Dioxide.

$$2H_2O_2 + MnO_2 \rightarrow 2H_2O + Mn + 2O_2$$

1. A chemistry class sets up nine test tubes and places different masses of MnO_2 in each test tube. An equal amount of H_2O_2 is added to each test tube and the volume of gas produced is measured each minute for five minutes. The data from the experiment is:

Tube #	MnO_2 (g)	1 min (ml O_2)	2 min (ml O_2)	3 min (ml O_2)	4 min (ml O_2)	5 min (ml O_2)
1	0.1	1.4	2.6	3.5	4.2	5.1
2	0.2	2.8	4.6	5.8	7.1	7.6
3	0.3	4.9	7.2	8.8	10.2	11.3
4	0.5	5.9	8.5	10.4	11.8	13.3
5	1.0	8.5	12.4	14.4	16.1	17.1
6	1.5	11.0	14.8	17.5	19.8	21.8
7	2.0	12.0	17.0	20.2	22.7	24.8
8	2.5	13.6	19.0	22.1	24.7	27.3
9	3.0	16.2	21.8	25.1	28.2	30.4

A. What volume of O_2 did tube #3 produce between the second and fourth minutes?
B. How much O_2 is produced in tube #5 during the first two minutes?
C. How much oxygen did tubes 7 and 8 produce together during the third minute?
D. What volume of oxygen gas, in liters, was produced during this procedure?
E. Graph the amount of oxygen produced each minute in test tubes # 2, 4, and 6.
F. By comparing the slope of the graph curves, which tube was producing oxygen at the fastest rate between minutes four and five?
G. Make a graph using the mass of manganese dioxide and the volume of oxygen for all tubes at five minutes.

2. The data in the table shows the age (in years), and the corresponding height (in inches), for a young man from age 2 to age 19.

Age	2	3	6	8	10	12	14	15	17	18	19
Height	28	33	40	46	52	55	61	64	70	72	72

A. Construct a graph from the data in this question. Be sure to properly label your graph (title, axes, measurements, etc.)
B. Include a trend-line showing the equation of the line and the correlation.
C. From the line, find the expected height of this man at the age of 13 years.
D. If the data was extended from 19 to 25 years of age, what would that data look like? How would the line of best-fits change if a trend-line includes ages 2-25?

IB Chem: Data + Graphing

1. A. 2ND → 4TH minute = 10.2 mL − 7.2 mL = **3.0 mL O_2**

   B. #5 first 2 minutes = **12.4 mL O_2**

   C. #7 + 8 during 3rd minute — #7 ⇒ 20.2 − 17.0 = 3.2 mL; #8 ⇒ 22.1 − 19.0 = 3.1 mL } **6.3 mL O_2**

   D. total O_2 produced = $158.7\ mL \times \frac{1\ L}{1000\ mL}$ = **0.1587 L O_2**

   E. See attached.

   F. tube #6 was producing the greatest amt of O_2 during the 5th minute

   G. see attached

2. A. see attached

   B. $y = 2.6152x + 24.428$

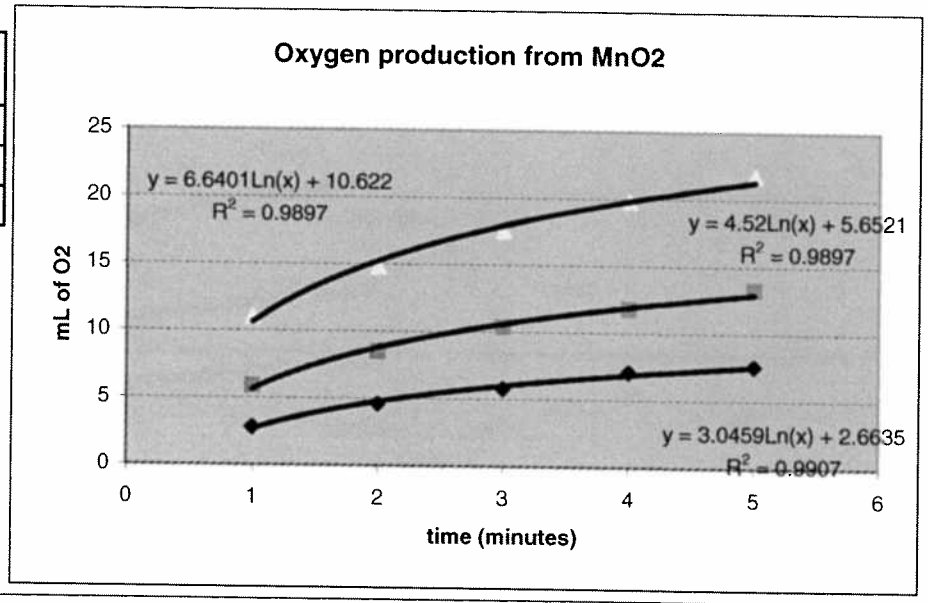
   C. $y = 2.6152(13) + 24.428 = 58$ cm

   $y = -0.0194(13)^2 + 3.025(13) + 22.906 = 59$ cm

   D. The graph would not be linear: it would become more logarithmic

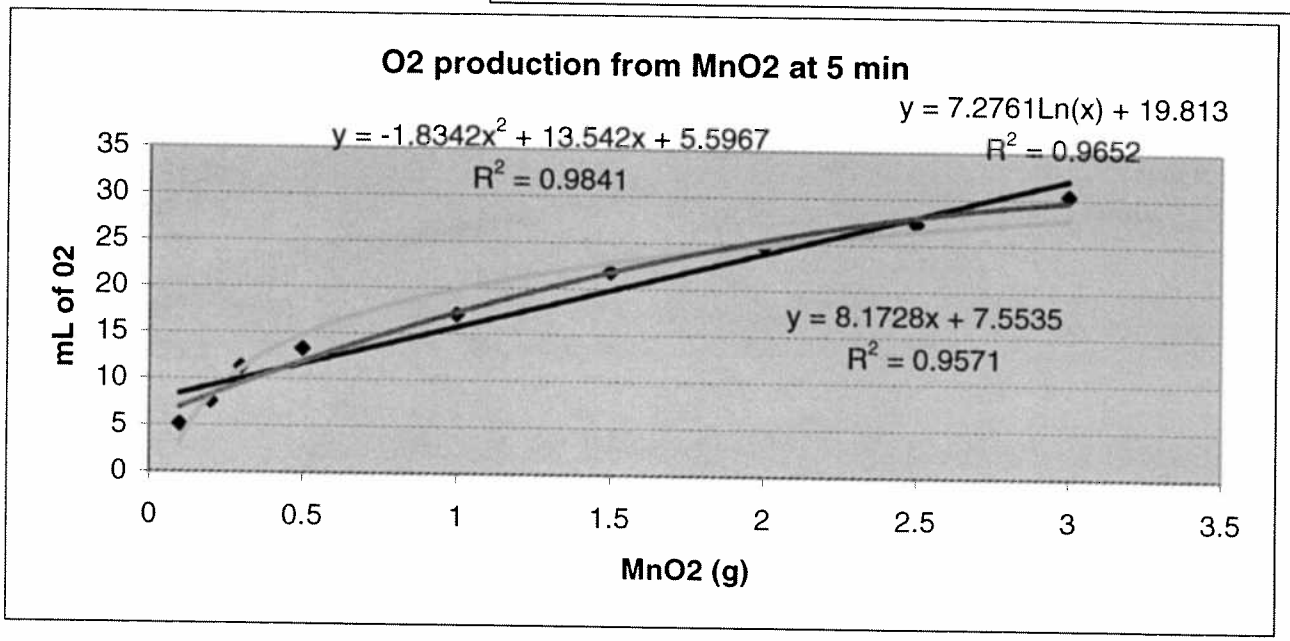
1E

MnO_2 (g)	1 min (ml O_2)	2 min (ml O_2)	3 min (ml O_2)	4 min (ml O_2)	5 min (ml O_2)
0.2	2.8	4.6	5.8	7.1	7.6
0.5	5.9	8.5	10.4	11.8	13.3
1.5	11	14.8	17.5	19.8	21.8



1G

MnO_2 (g)	5 min (ml O_2)
0.1	5.1
0.2	7.6
0.3	11.3
0.5	13.3
1	17.1
1.5	21.8
2	24.8
2.5	27.3
3	30.4



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Height	28	33	40	46	52	55	61	64	70	72	72