

Name: _____ Block: _____ Date: _____

Chemistry 12
RATES OF REACTION

1. A paraffin candle ($C_{28}H_{58}$) is placed in a petri dish on an electronic balance and combusted for a period of 15.0 min. The accompanying data is collected.

- Calculate the average rate of combustion of the paraffin over the entire 15 min period.
- Calculate the average rate of formation of water vapor for the same period.
- Note the mass loss in each 3.0 min time increment. Comment on the rate of combustion of the candle during the entire trial. Suggest a reason why the rate of this reaction isn't greatest at the beginning, with a steady decrease as time passes.



Time (min)	Mass (g)
0	180.00
3.0	178.00
6.0	175.98
9.0	173.99
12.0	172.00
15.0	170.01

2. A piece of zinc metal is placed into a beaker containing an aqueous solution of hydrochloric acid. The volume of hydrogen gas formed is measured by water displacement in a eudiometer every 30.0 s. The volume is converted to STP conditions and recorded.

- Determine the average rate of consumption of zinc metal over the entire 150.0 s in units of g/min.

Volume H_2 (STP) (mL)	0	15.0	21.0	24.0	25.0	25.0
Time (seconds)	0	30.0	60.0	90.0	120.0	150.0

- When is the reaction rate the greatest?
- What is the rate from 120.0 to 150.0 s?
- Assuming there is still a small bit of zinc left in the beaker, how would you explain the rate at this point?

3. A 3.45 g piece of marble (CaCO_3) is weighed and dropped into a beaker containing 1.00 L of hydrochloric acid. The marble is completely gone 4.50 min later. Calculate the average rate of reaction of HCl in mol/L/s. Note that the volume of the system remains at 1.00 L through the entire reaction.
4. Propane gas combusts in camp stoves to produce energy to heat your dinner. How long would it take to produce 6.75 L of CO_2 gas measured at STP? Assume the gas is combusted at a rate of 1.10 g C_3H_8 /min. Begin by writing a balanced equation for the combustion of C_3H_8 .
5. A 2.65 g sample of calcium metal is placed into water. The metal is completely consumed in 25.0 s. Assuming the density of water is 1.00 g/mL at the reaction temperature, how long would it take to consume 5.00 mL of water as it converts into calcium hydroxide and hydrogen gas?