

| Name: | Block: | Date: | |
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Chemistry 12 RATES OF REACTION

- A paraffin candle (C₂₈H₅₈) is placed in a petri dish on an electronic balance and combusted for a period of 15.0 min. The accompanying data is collected.
 - (a) Calculate the average rate of combustion of the paraffin over the entire 15 min period.
 - (b) Calculate the average rate of formation of water vapor for the same period.
 - (c) 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.



| | Mass (g) | Time (min) | |
|-------|----------|------------|--|
| 17.0 | 180.00 | 0 | |
| 12 m | 178.00 | 3.0 | |
| 72.02 | 175.98 | 6.0 | |
| 21.99 | 173.99 | 9.0 | |
| 11.99 | 172.00 | 12.0 | |
| 11,99 | 170.01 | 15.0 | |

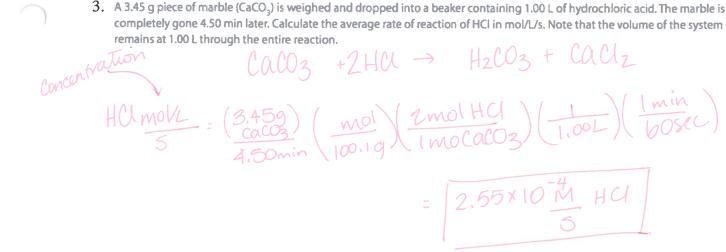
| 2 C28H58 +85O2 → 56CO2 +59H2O |
|--|
| a) $rate = \Delta m = (180.00 - 170.01)g = \frac{9.99g}{15 \text{ min}} = \frac{0.666g}{min} = \frac{C_{28}H_{58}}{min}$ |
| b) H20 = (0.666g) (mol) (58 mol H20) (18.09) = 0.8829 H20 min H20) |
| c) rate of consumption of parallin is nearly constant is upply of Oz is plentiful: nearly constant |

- 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.
 - (a) 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 |

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

$$(1) \frac{2n}{9} = (0.025 L) \left(\frac{mol}{120.05} \right) \left($$



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 CO₂ gas measured at STP? Assume the gas is combusted at a rate of 1.10 g C₃H₈/min. Begin by writing a balanced equation for the combustion of C₃H₈.

Take
$$(3H_8 + 50_2 \rightarrow 3CO_2 + 4H_2O)$$
Take $(3H_8 + 50_2 \rightarrow 3CO_2 + 4H_2O)$
 $(3H_8 + 50_2 \rightarrow 3CO$

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?

$$\frac{\text{CQ} + 2 \text{H}_2\text{O}}{25.05} \rightarrow \frac{\text{CQ}(\text{OH})_2 + \text{H}_2}{\text{2mol H}_2\text{O}} + \frac{\text{H}_2\text{O}}{18.09} + \frac{\text{H}_2\text{O}}{109} = 0.0952 \text{mL}$$

time to consume =
$$(5.00 \text{mL})(\frac{5}{0.0952 \text{mU}}) = [52.55]$$