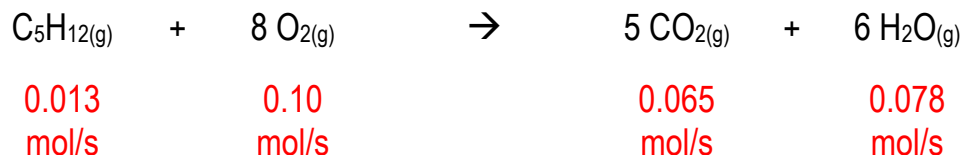


## Reaction Rate Review

1.  $\text{C}_5\text{H}_{12}$  Rate =  $(28.8 \text{ g C}_5\text{H}_{12} / 30. \text{ S}) (1 \text{ mole C}_5\text{H}_{12} / 72.0 \text{ g C}_5\text{H}_{12})$   
 =  $0.013 \text{ mol C}_5\text{H}_{12}/\text{s}$



2.  $\text{N}_2$  Rate =  $(112 \text{ L N}_2 / 10. \text{ s}) (1 \text{ mole N}_2 / 22.4 \text{ L}) = 0.50 \text{ mole N}_2/\text{s}$

$\text{N}_2$  Rate =  $14 \text{ g/s}$

$\text{H}_2$  Rate =  $3.0 \text{ g/s}$

$\text{NH}_3$  Rate =  $17 \text{ g/s}$

3.  $\text{C}_2\text{H}_6$  Rate =  $(1 \text{ mole C}_2\text{H}_6 / 30. \text{ g C}_2\text{H}_6) (96 \text{ g C}_2\text{H}_6 / 10. \text{ min}) (1 \text{ min} / 60 \text{ s})$   
 =  $0.0053 \text{ mole C}_2\text{H}_6/\text{s}$

$\text{C}_2\text{H}_6$  Rate =  $0.16 \text{ g/s}$

$\text{O}_2$  Rate =  $0.42 \text{ g/s}$

$\text{CO}$  Rate =  $0.31 \text{ g/s}$

$\text{H}_2\text{O}$  Rate =  $0.29 \text{ g/s}$

4.  $\text{NH}_3$  Rate =  $25 \text{ L/min}$

$\text{O}_2$  Rate =  $43 \text{ L/min}$

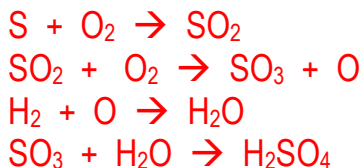
$\text{NO}_2$  Rate =  $25 \text{ L/min}$

$\text{H}_2\text{O}$  Rate = not gaseous so no rate in L/min

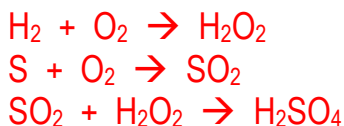
5. Watch out for excess stoichiometry!  $\text{HCl}$  is limiting reagent!

$\text{H}_2$  Rate =  $3.4 \text{ L/min}$

6. The likelihood of 4 reactant particles having a simultaneous collision with appropriate energy and geometry is negligible. Reactions occur via collisions of 2 particles at a time. Two possible mechanisms are:



Or



This is far too involved for our 2020 TEST

7.

- a) Fast: only electrons being exchanged, homogeneous phase initially, simple mechanism
- b) Slow: many bonds to break and form, complex reaction mechanism (many particles)
- c) Medium: simple mechanism with few bonds to break and form, but mixed phases will slow the reaction
- d) Slow: non-reactive inert gas
- e) Fast: only electrons being exchanged, homogeneous phase initially, simple mechanism

8.

a) Rate order =  $2 + 3 + (-1) = 4$  (fourth order)

b) Rate order =  $\frac{1}{2} + x = 1 \therefore x = \frac{1}{2}$

9.

Rate at 40 s = 0.68 M / 98 s =  $6.9 \times 10^{-3}$  M/s

Rate at 140 s = 0.10 M / 100. s =  $1.0 \times 10^{-3}$  M/s

**A is a reactant.** The slope, and therefore the reaction rate, is decreasing with time. This must be the result of reactants being consumed. As the concentration of reactants decreases, fewer particles collide successfully and the rate of reaction decreases.

NOT on  
OUR  
2020 TEST