Chemistry
Reaction rates

Name:
Period: Key 2018

Rates of reactions
Go to http://www.chem4kids.com/files/react_rates.html

1. What effect does the number of collisions between reactant molecules have on the rate that a reaction occurs?

↑ collisions = ↑ rate of rxn

2. Why does increasing the concentration of reactants cause the reaction rate to increase?

↑ reactants → ↑ collisions → ↑ rate of rxn

3. Why does lowering the temperature of a reaction cause the reaction rate to slow down?

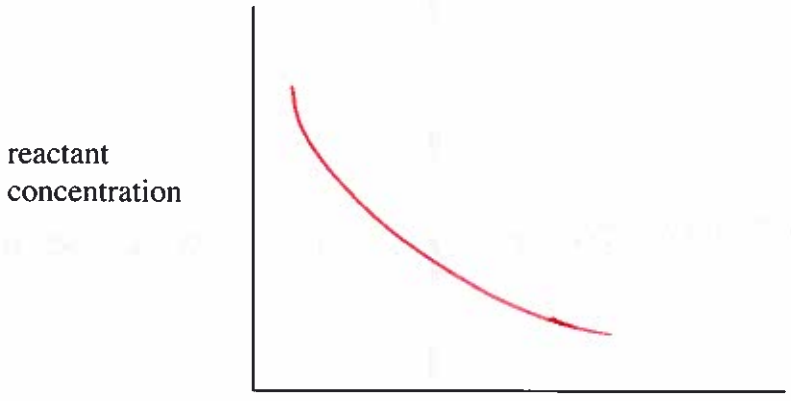
↓ T → slower particles → ↓ collisions → ↓ rate of rxn

4. Why does increasing the pressure cause the reaction rate for gas reactions to increase?

↑ P → particles are closer together → ↑ collisions → ↑ rate of rxn

$P = \frac{F}{A}$ ← $F = ma$ → conc., temp
← deals w/ S.A.

5. Draw the graph below



6. What would the slope of the graph above represent?

Rxn Rate

Click this link to take you through questions 7-16.
http://www.chem4kids.com/extras/quiz_reactrate/index.html

7. True or false All chemical reactions happen at the same speed.

8. True or false Reaction rates can be changed.

9. Define reaction rate.
change in reactant or product conc. over a specific period of time

10. Reaction rates depend on forward and reverse reactions.

11. True or false Radioactive half-life is related to reaction rates. totally diff.

12. List three factors that can effect reaction rate.
concentration S.A.
temp catalyst
pressure (not on test)

13. True or false Reaction rates can change over time as a reaction proceeds.

14. True or false Some reaction rates are constant.

15. The steps in a chemical reaction are called the reaction mechanism.

16. The slowest step in a chemical reaction is called the rate-determining step.

Rates of reaction menu
Go to http://www.chemguide.co.uk/physical/basicratesmenu.html#top

Effect of surface area on reaction rates

17. Why will a finely divided powder react faster than a single lump of a material?

Yes! ↑ S.A. → more reactant exposed & available to react

18. a. What surface catalysts are used in the catalytic converters for cars?

metals like platinum, palladium, rhodium

b. What compounds are the carbon monoxide and nitrogen monoxide converted into?

CO_2 & N_2

carbon dioxide nitrogen gas

The effect of concentration on reaction rates

19. Why does increasing the surface area of a solid reactant have the same effect as increasing the concentration?

both increase the rxn rate. S.A. ↑ exposure of reactants while ↑ conc. ↑ the # of reactants.

20. Why will the surface area of a catalyst limit the reaction rate changes caused by concentration?

conc. cannot affect the rxn rate if the catalyst is working the best it can.

21. The following reaction takes place in the following steps

Cl_2 ---- uv ----> 2 Cl (very slow)

2 Cl + C_2H_4 --------> $C_2H_4Cl_2$ (very fast)

Why is the reaction rate much more effected by Cl_2 concentration than C_2H_4 concentration?

Cl_2 -- uv --> 2 Cl is the rate determining step because it's the slowest.

The effect of pressure on reaction rates

22. Why does increasing the gas pressure in an all gas reaction have the same effect as increasing the concentration of the gases?

Both increase # collisions & increase rxn rate

↑P at a conc ≈ ↑conc at a P

23. Virgil Ivan Grissom, Edward Higgins White, and Roger Bruce Chaffee were Apollo Astronauts that died in a simulator fire that happened when an electrical wire started a fire in a 100% oxygen atmosphere. Why would a fire in 100% oxygen spread much more quickly than a fire in ordinary air?

The conc of the reactant was at a max

The effect of temperature on reaction rates

24. What happens to the number of molecules that have the activation energy needed to start a reaction as the temperature is raised in a reaction?

As T ↑, the # of mol w/enough act E ↑

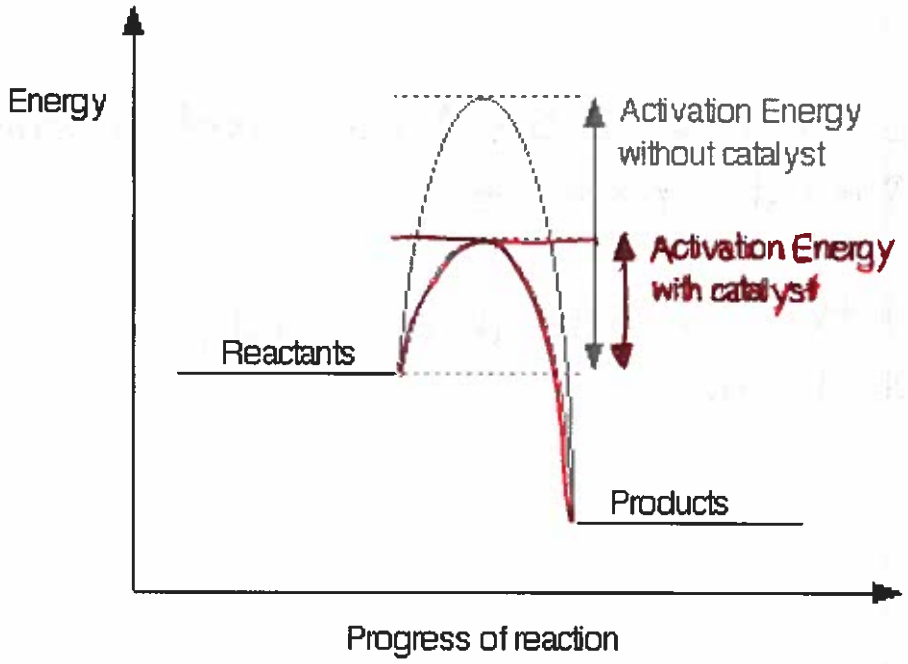
25. What happens to the number of collisions between reactant molecules as the temperature is increased in a reaction?

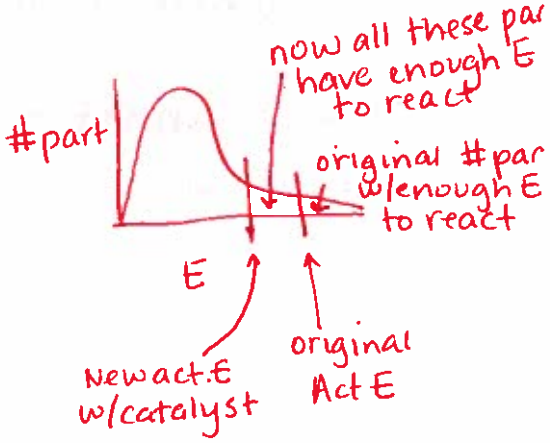
As T ↑, particles move faster & collide more

26. Why does refrigeration allow food to keep longer?

↓ T ⇒ ↓ E ⇒ Food doesn't spoil as quickly (Rxn is slowed down)

The effect of catalysts on reaction rate



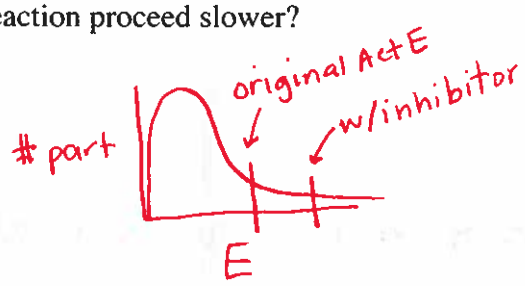


27. Using the graph above explain why a larger percentage of reactant molecules have the ability to react to form a product when a catalyst is added to the reaction.

When reactants are mixed, it requires a certain amount of E (Activation E) to make the reaction happen. With a catalyst, the amount of E needed (Act. E) to make the reaction happen is LESS. In other words, a catalyst lowers the Act. E and allows more particles to react.

28. When a(n) inhibitor is added to a reaction, it creates a reaction path that requires more activation energy than originally. Why would the reaction proceed slower?

More E is needed for the reaction to occur



29. $2\ Cu + O_2 \longrightarrow 2\ CuO$ has very high activation energy. Explain why copper oxide forms very slowly at room temperature but will rapidly form when the copper is heated.

When the copper is heated it has more E (part moving faster). This speeds up the reaction.