

Chemical reactions that occur fast	Chemical reactions that occur slowly
..... of food
Blast of a of fruits
Sodium reacting with
Zn reacting with	Manufacturing of &

Reactants and products

During a chemical reaction, will turn into

..... →

$2 \text{HCl} + \text{Mg} \rightarrow \dots + \dots$

$\text{CaCO}_3 \rightarrow \dots + \dots$

$\text{CuSO}_4 + \text{Zn} \rightarrow \dots + \dots$

Starch → Maltose + water

Rate of reaction

- 1) Amount of being used during an unit
- 2) Amount of being produced during unit
- 3) taken to use a unit amount of
- 4) taken to produce a unit amount of

Amount of being used

Rate of reaction = -----

.....

Amount of produced

Rate of reaction = -----

.....

Rate of reaction = -----

Amount of being used

.....

Rate of reaction = -----

Amount of being produced

1) Tube A - 2g of Mg pieces took 10 minutes disappear in 10ml of diluted HCl acid

Tube B – 2g Mg powder took 2 minutes to disappear in 10ml of diluted HCl acid

(i) Find the rate of reaction in tube A

(ii) Find the rate of reaction in tube B

Amount of being used

Rate of reaction in tube A =

.....

=/.....

=

Amount of being used

Rate of reaction in tube B =

.....

=/.....

=

Therefore, the in tube is more than the in tube

2) Tube A - 2g of Mg pieces and 10ml of diluted HCl acid produced 5cm³ of gas in 2minutes.

Tube B – 2g Mg powder and 10ml of diluted HCl acid produced 15cm³ of gas in 3minutes.

(i) Find the rate of reaction in tube A

(ii) Find the rate of reaction in tube B

$$\begin{aligned} \text{Rate of reaction in tube A} &= \frac{\text{Amount of being produced}}{\text{.....}} \\ &= \text{.....}/\text{.....} \\ &= \text{.....} \end{aligned}$$

$$\begin{aligned} \text{Rate of reaction in tube B} &= \frac{\text{Amount of products produced}}{\text{Time}} \\ &= \text{.....}/\text{.....} \\ &= \text{.....} \end{aligned}$$

Therefore, the rate of reaction in tube B is more than the rate of reaction in A

3) Tube A – 2g of Mg pieces disappeared in 5minutes when 10ml of diluted HCl acid was added.

Tube B – 2g Mg powder disappeared in 2 minutes when 10ml of diluted HCl acid was added.

(i) Find the rate of reaction in tube A

(ii) Find the rate of reaction in tube B

Rate of reaction in tube A = $\frac{\text{Amount of being used}}{\text{.....}}$
 =/.....
 =

Rate of reaction in tube B = $\frac{\text{Amount of being used}}{\text{.....}}$
 =/.....
 =

Therefore, the rate of reaction in tube B is more than the rate of reaction in A

4) Tube A - 2g of Mg pieces and 10ml of diluted HCl acid produced 5cm³ of gas in 2minutes.

Tube B – 2g Mg powder and 10ml of diluted HCl acid produced 8cm³ of gas in 2minutes.

(i) Find the rate of reaction in tube A

(ii) Find the rate of reaction in tube B

Rate of reaction in tube A = $\frac{\text{Amount of } \dots\dots\dots \text{ being produced}}{\dots\dots\dots}$

= $\dots\dots\dots / \dots\dots\dots$

= $\dots\dots\dots$

Rate of reaction in tube B = $\frac{\text{Amount of } \dots\dots\dots \text{ being produced}}{\dots\dots\dots}$

= $\dots\dots\dots / \dots\dots\dots$

= $\dots\dots\dots$

Therefore, the rate of reaction in tube B is more than the rate of reaction in A

Factors which affects the rate of reaction

- 1) Total $\dots\dots\dots$ ($\dots\dots\dots$ nature)
- 2) $\dots\dots\dots$
- 3) $\dots\dots\dots$ of reactants
- 4) $\dots\dots\dots$
- 5) $\dots\dots\dots$ for $\dots\dots\dots$ reactants

Total (..... nature)

- 1) When a particle is broken down into particles, their total will
- 2) 5g of Mg will have more total than 5g of Mg
- 3) More will come into contact when the total is
- 4) When a log of is into pieces the total will
- 5) Therefore more molecules can come into contact with the pieces of wood than the log of wood.
- 6) Therefore pieces of wood will more easily than a log of wood.
- 7) Medicine in form will bring a quick relief than
- 8) patients are asked to medicine and swallow without swallowing the
- 9) It is easy to when vegetables are into pieces.
- 10) Mg in form will react faster with diluted HCl than Mg
- 11) Therefore the rate of reaction when the total surface area

Temperature

- 1) increases when the energy of particles
- 2) Therefore particles move when the is
- 3) When the particles move, the taken by the to knock on each other will be
- 4) When the particles of quickly come into contact with each other, products will be produced in a period of time.
- 5) Therefore the will when the increases.

- 6) 2g of Mg powder will react with 20cm³ of diluted HCl at 80°C than 2g of Mg powder with 20cm³ of diluted HCl at
- 7) Acidified colour at 80°C will become quickly when a cleaned nail is inserted than the acidified colour at temperature when a cleaned nail is inserted.
- 8) Therefore the increases when the increases.

..... of reactants

- 1) When the concentration is, there will be particles.
- 2) When particles are present, the chances of particles coming into contact (collision of particles) will be
- 3) When the particles come into contact, the reaction will occur
- 4) Therefore when the of reactants are, the will be
- 5) Add 2ml of diluted HCl and 8ml of water to test tube A and add 5ml of diluted HCl and 5ml of water to test tube B and 8ml of diluted HCl and 2ml of water to test tube C
- 6) Add 2g of cleaned Mg strips each to test tube A, test tube B and test tube C
- 7) Rate of emitting were in tube C and the rate of emitting were in tube A.
- 8) Therefore increases when the of reactants

Pressure

- 1) affects the when the are in state.
- 2) To the the has to be
- 3) When the reduces the get closer to each other.
- 4) Therefore the come into contact and the reaction occurs.
- 5) Therefore when the increases the will increase.

Catalysts

- 1) Catalysts the
- 2) Catalysts will not become the part of
- 3) Therefore the are not being during a
- 4) Therefore a can be used over and over again to the
- 5) A particular can only the in one type of reaction. Therefore are highly
- 6) A amount of catalyst is sufficient to the of a large number of reactants.
- 7) Decomposition of can be catalyzed by
- 8) Add 10cm³ of H₂O₂ into two test tube.
- 9) Add 2g of into one of the two test tubes having
- 10) The rate of emitting gas bubble will be in the test tube having
- 11) But during the reaction mass of will not be
- 12) Therefore the has the of decomposition of without getting
- 13) The substances which the are called
- 14) A few drops of will the of
- 15) 15) Porous iron is used as the catalyst when producing using Haber process.
- 16) Nickel is used as the catalyst when producing by hydrogenation of unsaturated fats.
- 17) Platinum is used as a catalyst when producing by oxidizing ammonia
- 18) Vanadium pentoxide is used as a catalyst when producing using contact method.
- 19) 19) Enzymes are Eg – Amylase, sucrose, pepsin

20) Some synthetic are used in

3. Given here is a set-up arranged to show the effect of a certain factor on the rate of reaction, in which only dilute hydrochloric acid (HCl) and the metal zinc (Zn) in the form of small pieces and powder are used.

(i) Name **four** factors that can influence the rate of a chemical reaction.

(ii) Name the equipments marked as *A*, *B*, *C* and *D* in the set-up in sequence.

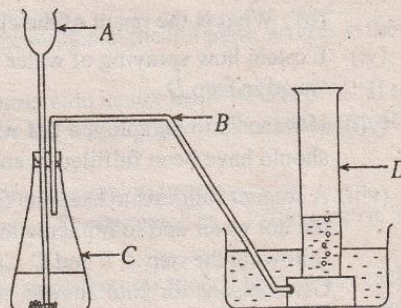
(iii) The influence of which factor you mentioned in (i) above, could be tested using the same materials that have been provided in same form?

(iv) Write down the reaction that takes place in the vessel *C*, as a balanced chemical equation.

(v) State what type of a chemical reaction it is.

(vi) State the readings that are taken to determine the rate of the reaction between HCl and Zn.

(vii) Describe how you would show that the factor you mentioned in (iii) above influences the rate of reaction based on the observations of this experiment.



(viii) You are provided with two rubber balloons, one filled with the gas produced at this reaction and the other filled with an equal volume of ordinary air in it, separately. Without performing any chemical test, explain how you would identify the balloon filled with the gas produced at the experiment.

(ix) It is sufficient to use 0.1 mole of Zinc for the above experiment. Accordingly, what is the mass of Zinc, that should be added to the flask? ($Zn = 63$)