Effect of Changing Pressure on Rate of Reaction Worksheet

Combined Science - Chemistry - Key Stage 4

The Rate and Extent of Chemical Change

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What is rate?

A

How quickly a reaction starts

B

How quickly gas is produced every 30 seconds

C

How quickly a reactant is used up

D

None of the above

What is rate?

C

How quickly a reactant is used up

The volume of hydrogen gas produced from a chemical reaction is 18 cm^3 from 0 - 15 seconds, calculate the rate.

A

270 g/s

B

270 cm^3/s

C

1.2 g/s

D

1.2 cm^3/s

The volume of hydrogen gas produced from a chemical reaction is 18 cm^3 from 0 - 15 seconds, calculate the rate.

D

1.2 cm^3/s

Which of the following is NOT a factor affecting rate of reaction?

A

Pressure of reacting gases

B

Concentration of reacting particles in a solution

C

Colour of the reactant

D

Presence of a catalyst

Which of the following is NOT a factor affecting rate of reaction?

C

Colour of the reactant

1.5 g of magnesium reacts with acid to give a salt and hydrogen, how can we increase the rate of reaction?

A

Using larger pieces of magnesium ribbon

B

Turning the magnesium into a powder

C

Using a lower concentration of acid

D

None of the above

1.5 g of magnesium reacts with acid to give a salt and hydrogen, how can we increase the rate of reaction?

B

Turning the magnesium into a powder

From a graph where time is on the x-axis and volume of gas is on the y-axis, how can we tell that the reaction is complete?

A

The line becomes horizontal

B

The line becomes steeper

C

The line increases in a directly proportional manner

D

We cannot tell

From a graph where time is on the x-axis and volume of gas is on the y-axis, how can we tell that the reaction is complete?

A

The line becomes horizontal

Question 1

Ethanol is produced from the reaction between ethene and steam at 300°C and 60 atm pressure using a catalyst. This can be written as:

$$C_2H_4(g) + H_2O(g) \rightleftharpoons C_2H_5OH(g)$$

1) State the reactant(s).
2) What is state of matter for steam?
3) Explain how increasing the pressure of the reactants will increase the rate of reaction.

Question 2

Ammonia is produced by the reaction of nitrogen and hydrogen passed over an iron catalyst. This can be written as:

$$N_2 + H_2 \rightleftharpoons NH_3$$

1) Balance the symbol equation:

$$N_2 + \_\_ H_2 \rightleftharpoons \_\_ NH_3$$

2) What is state of matter for nitrogen?
3) Explain how increasing the pressure will increase the rate of reaction.

Question 3

Methane reacts with oxygen to produce carbon dioxide and water. This can be written as:

$$CH_4 + O_2 \rightleftharpoons CO_2 + H_2O$$

1) Balance the symbol equation:

$$CH_4 + \_\_ O_2 \rightleftharpoons CO_2 + \_\_ H_2O$$

2) Explain how increasing the pressure will increase the rate of reaction.
3) Why do industries advise against increasing the pressure of methane in this reaction?

Question 1 answer

Ethanol is produced from the reaction between ethene and steam at 300°C and 60 atm pressure using a catalyst. This can be written as:

$$C_2H_4(g) + H_2O(g) \rightleftharpoons C_2H_5OH(g)$$

1) State the reactant(s). *Ethene and steam*
2) What is state of matter for steam? *gas*
3) Explain how increasing the pressure of the reactants will increase the rate of reaction.

Increasing pressure of the reactants will increase rate of reaction because the reacting particles get closer together and the particles collide more frequently.

Question 2 answer

Ammonia is produced by the reaction of nitrogen and hydrogen passed over an iron catalyst. This can be written as:

$$N_2 + H_2 \rightleftharpoons NH_3$$

1) Balance the symbol equation:

$$N_2 + \underline{3}\ H_2 \rightleftharpoons \underline{2}\ NH_3$$

2) What is state of matter for nitrogen? gas
3) Explain how increasing the pressure will increase the rate of reaction.

Increasing pressure of the reactants will increase rate of reaction because the reacting particles get closer together and the particles collide more frequently.

Question 3 answer

1) Balance the symbol equation:

$$CH_4 + \underline{2}\ O_2 \rightleftharpoons CO_2 + \underline{2}\ H_2O$$

2) Explain how increasing the pressure will increase the rate of reaction.

Increasing pressure of the reactants will increase rate of reaction because the reacting particles get closer together and the particles collide more frequently.

3) Why do industries advise against increasing the pressure of methane in this reaction?

Pressure that is too high can result in an explosion.

Summary Quiz

Why does the rate of reaction increase when the concentration of reactants is increased?

A

Particles collide with more energy

B

Particles collide more

C

Particles collide more frequently

D

None of the above

Why does the rate of reaction increase when the concentration of reactants is increased?

C

Particles collide more frequently

Increasing the pressure of reacting particles in a container decreases the...

A

Volume of gas

B

Rate of reaction

C

Frequency of particles colliding

D

Concentration of reacting particles

Increasing the pressure of reacting particles in a container decreases the...

A

Volume of gas

Why does increasing temperature increase the rate of reaction?

A

Particles collide more

B

Particles collide more frequently with more energy

C

Particles don’t have to overcome the activation energy barrier

D

All of the above

Why does increasing temperature increase the rate of reaction?

B

Particles collide more frequently with more energy

Why do smaller pieces of marble chips react more quickly with hydrochloric acid than larger pieces?

A

Particles collide more

B

Particles collide more frequently with more energy

C

Particles collide more frequently

D

All of the above

Why do smaller pieces of marble chips react more quickly with hydrochloric acid than larger pieces?

C

Particles collide more frequently