

# **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  $18 \text{ cm}^3$  from 0 - 15 seconds, calculate the rate.**

A

$270 \text{ g/s}$

B

$270 \text{ cm}^3/\text{s}$

C

$1.2 \text{ g/s}$

D

$1.2 \text{ cm}^3/\text{s}$



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

D

$1.2 \text{ cm}^3/\text{s}$



# 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:

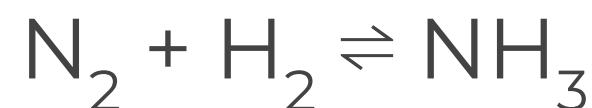


- 1) State the reactant(s).
- 2) What is state of matter for steam?
- 3) Explain how increasing the pressure of the reactants will increase the rate of reaction.

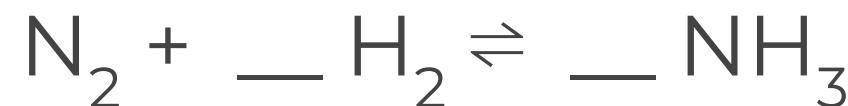


## Question 2

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



- 1) Balance the symbol equation:

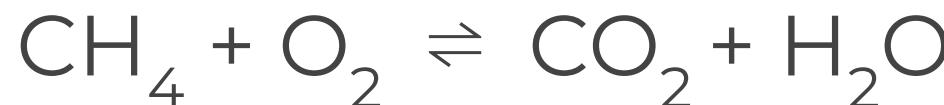


- 2) What is state of matter for nitrogen?
- 3) Explain how increasing the pressure will increase the rate of reaction.

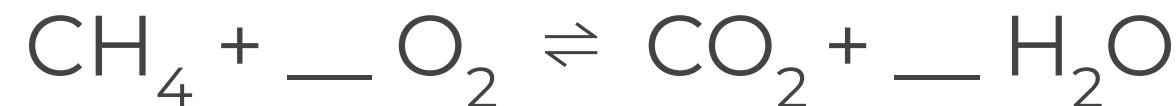


## Question 3

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



- 1) Balance the symbol equation:



- 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:



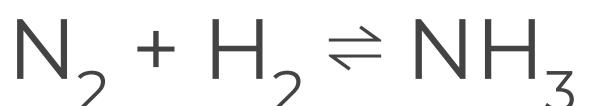
- 1) State the reactant(s). *Ethene and steam*
- 2) What is state of matter for steam? *gas*
- 3) Explain how increasing the pressure of the reactants will increase the rate of reaction.

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

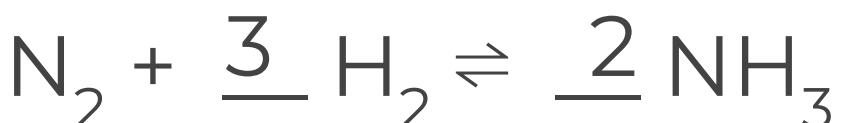


## Question 2 answer

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



- 1) Balance the symbol equation:



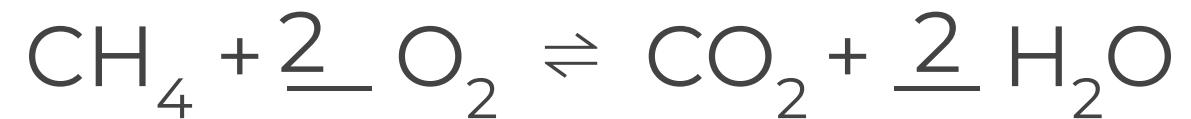
- 2) What is state of matter for nitrogen? gas
- 3) Explain how increasing the pressure will increase the rate of reaction.

*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:



- 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

