

# Year 9 Biology- Term 3: Communicable and Non-communicable Disease

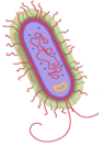
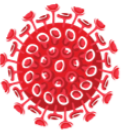


## Key Words

- **Antibiotics:** Medicines that help to cure bacterial disease by killing infective bacteria inside the body.
- **Clinical drug testing:** Drug testing done on healthy human volunteers and patients.
- **Communicable disease:** A disease that can be spread between individuals either directly or indirectly.
- **Coronary heart disease:** A disease caused by the buildup of fatty deposits inside the coronary artery, narrowing it and reducing blood flow to the heart tissue.
- **Double blind trial:** A study performed where neither the researcher or patient know whether the patient is taking the drug or a placebo.
- **Gonorrhea:** A sexually transmitted disease (STD) caused by a bacterium with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating.
- **Health** is a state of physical and mental wellbeing.
- **Human Immunodeficiency Virus (HIV):** An infectious virus that weakens the immune system and can lead to AIDS (acquired immunodeficiency syndrome).
- **Malaria:** A disease caused by a protist that causes recurrent episodes of fever and can be fatal.
- **Measles:** A serious disease caused by a virus that shows symptoms of fever and a red skin rash.
- **Monoclonal antibodies:** Antibodies produced from a single clone of cells that are specific to one binding site on one protein antigen.
- **Non-communicable disease:** A disease which cannot be spread between individuals.
- **Pathogens:** Microorganisms that cause infectious disease.
- **Placebo:** A substance designed to be indistinguishable from a drug being tested but has no actual effect on the patient.
- **Preclinical drug testing:** Drug testing done in a laboratory using cells, tissues and live animals.
- **Rose black spot:** A fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early.
- **Salmonella:** A bacterial disease that is spread by bacteria ingested in food and can cause a fever, abdominal cramps, vomiting and diarrhea.
- **Side effects:** Other additional effects that the drug has that are different from the expected effect of the drug.
- **Tobacco Mosaic Virus (TMV):** A widespread plant pathogen affecting many species of plants which produces a mosaic pattern on the leaves and limits the plant growth.
- **Vaccination:** The process of introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies.
- **White blood cell:** An important type of cell that makes up the immune system and produces antibodies and antitoxins.

## COMMUNICABLE DISEASES

All communicable diseases are caused by pathogens.

*Pathogen: Microorganisms that causes disease.*

			
BACTERIA	VIRUS	FUNGI	PROTIST
Reproduce rapidly inside the body. Release toxins that make us ill.	Live & reproduce inside human cells causing damage. Rapidly reproduce.	Multicellular organisms that prefer damp/moist environments.	Microorganisms that have features belonging to plants animals and fungi.

### How can it spread?

- ❑ Direct physical contact. Any pathogen can be transported via this method.

Transferred by exchange of bodily fluids during sex.

Plant diseases are commonly transferred by this method.

- ❑ A vector is living organism that transmits an infectious agent from an infected organism to another.

Mosquitos are a vector. When the mosquito bites someone else the micro-organism is transferred, and that person catches malaria.

- ❑ **Airborne**
- ❑ **In water** - Humans eating raw, undercooked or contaminated food or drinking water containing sewage can spread diseases. Pathogens enter

### Defence against infection

1. Physical barriers – prevent pathogens getting in
2. Chemical defences – kill pathogens before they harm us

#### White blood cells:

- Ingest pathogens and destroy them.
- Produce antibodies to destroy particular pathogens.
- Produce antitoxins that counteract the toxins released by pathogens.

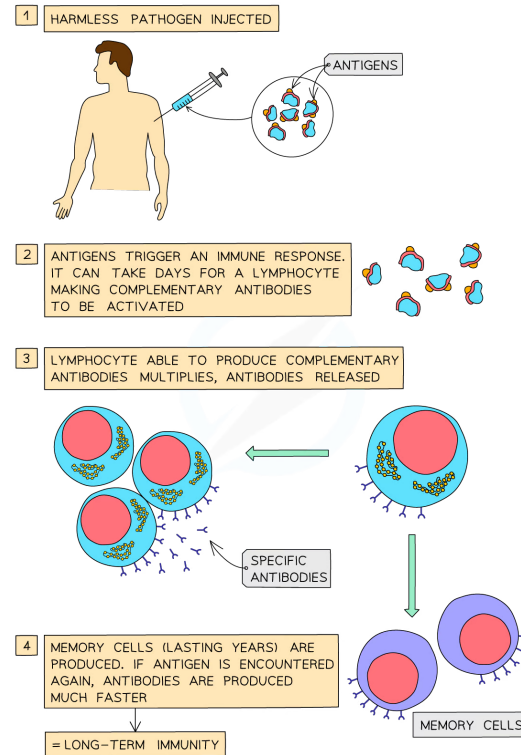


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## Vaccines

Vaccines allow a dead or altered form of the disease-causing pathogen to be introduced into the body, which contain a specific . This causes the immune system, specifically the , to produce complementary , which target and attach to the antigen. When a white blood cell engulfs and digests a pathogen it is called phagocytosis.



## Non-Communicable Disease

Non-communicable diseases cannot be passed on to another organism.

Non-communicable diseases include:

- Cancer
- Diabetes
- Genetic diseases and conditions
- Heart disease
- Neurological disorders

**Causes of cancer:** Ionizing radiation e.g Gamma Rays, Viral infection, Chemicals in food or cigarette, Inherited mutations in the gene



## Other factors affecting health

There are some other factors which can affect your health:

- **Diet:** poor diet can affect both physical and mental health.
- **Stress:** being under constant stress can put physical and mental health under strain.
- **Situation:** whether you have access to healthy food and medical care.



# Practice Knowledge Quiz Questions

1. What is the difference between a communicable and a non-communicable disease?

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Q2. Microorganisms cause infections.

The human body has many ways of defending itself against microorganisms.

- (a) Describe **two** ways the body prevents the entry of microorganisms.

1 .....

2 .....

Pathogens are microorganisms that cause infectious disease. Draw one line from each disease to the way the disease is spread.

Disease	Way the disease is spread
Salmonella	A vector (e.g. mosquitos)
Cholera	Drinking contaminated water
influenza	Droplets in the air when people cough or sneeze
Malaria	Eating food that is contaminated

Gonorrhoea is treated with an antibiotic.

HIV is another sexually transmitted disease.

Explain why prescribing an antibiotic will **not** cure HIV.

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Vaccination can protect us from the diseases pathogens cause.

- (i) One type of virus causes measles.

A doctor vaccinates a child against measles.

What does the doctor inject into the child to make the child immune to measles?

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Q4. White blood cells protect the body against pathogens such as bacteria and viruses.

- (a) (i) Pathogens make us feel ill.

Give **one** reason why.

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- (ii) White blood cells produce antibodies. This is one way white blood cells protect us against pathogens.

Give **two** other ways that white blood cells protect us against pathogens.

# Year 9 Chemistry - Term 3: Chemical analysis

## Key Words

**Chromatography** – The process whereby small amounts of dissolved substances are separated by running a solvent along a material such as absorbent paper (chromatography paper).

**Formulation** – a mixture that has been designed to produce a useful product.

**Pure substance** – one that is made up of just one substance, this can either be an element or a compound.

**Fixed points** – the melting and boiling points of an element or compound.

**R<sub>f</sub> value (retention factor)** – distance moved by a solute divided by the distance moved by the solvent.

**Mobile phase** – the solvent used in chromatography.

**Stationary phase** – the chromatography paper.

**Solute** – A substance that is dissolved in a solution.

**Solvent** – A liquid that dissolves a solute.

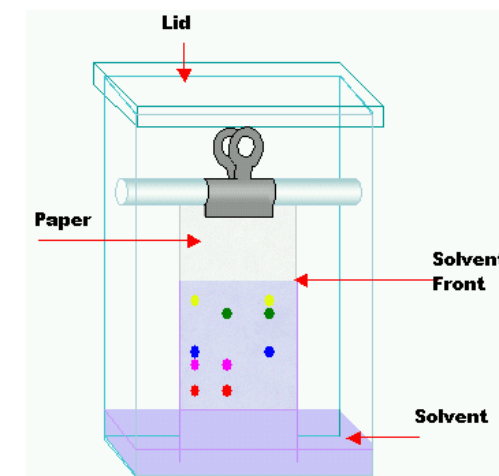
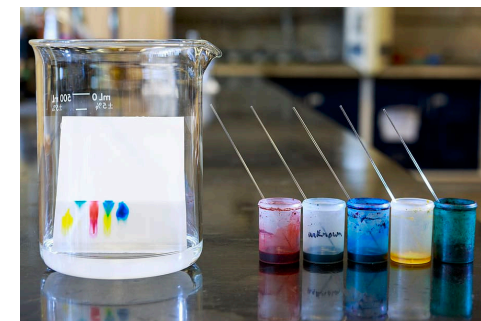
**Control variable** – a factor in an investigation that we must keep the same to prevent errors in our results.

**Independent variable** – a factor in an investigation that we change i.e. temperature.

**Dependent variable** – a factor that we observe/ measure in an investigation.

**Mean** – the average number in a set of data (add the values together and divide this by the number of values you have)

**Reproducible** – a measurement is reproducible if it is completed by another person and the same results are obtained.



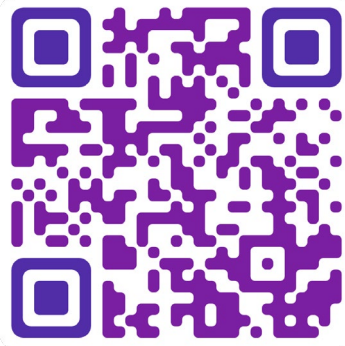
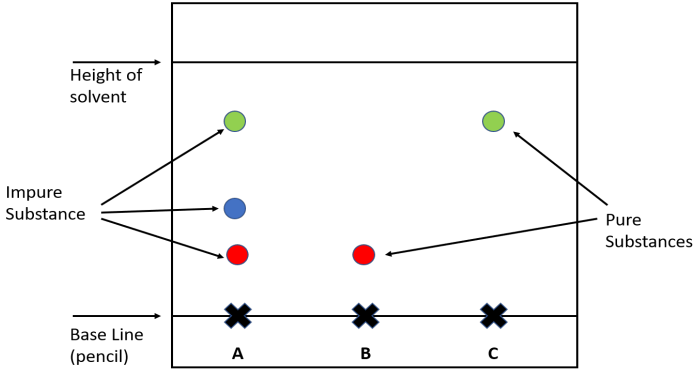


Chemical Analysis – Paper Chromatography RPA

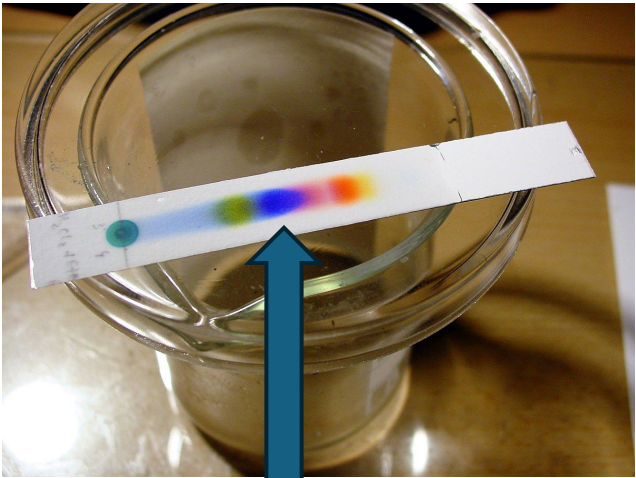
Use paper chromatography to distinguish between Pure substances and Impure substances. It always involves a mobile phase and stationary phase. Measure the  $R_f$  (retention factor) and using the equation below compare your results with a data book to determine the unknown substance

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

This chromatogram shows that A is a mixture of three substances, B and C plus one other unknown substance



Scan the QR code with your mobile phone to access a 10-minute video on how to complete the Chromatography RPA.



Chromatography paper that has been used and shows solutes moved up including the solvent front is known as a chromatogram.

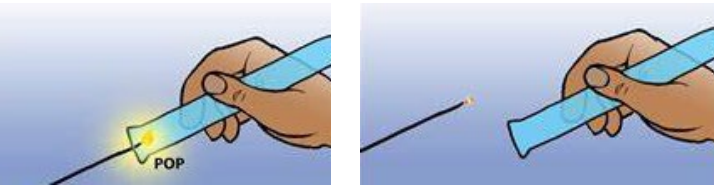
Method for RPA chromatography

1. Draw a pencil line across the bottom of the chromatography paper 2 cm from the bottom using a ruler.
2. Evenly place dots along the pencil line using the solutes given (i.e., ink)
3. Carefully place 5cm<sup>3</sup> of the solvent into a beaker.
4. Carefully lower the chromatography paper in the solvent ensuring that the solvent does not go above the pencil baseline.
5. The solvent will begin to move up the chromatography paper taking the solutes with them. These will be seen as different colours on the paper.
6. When the solvent has stopped moving up the paper, this is your solvent front, draw a pencil line across the paper where this has finished.
7. Then calculate the  $R_f$  values (to do this, measure the distance moved by the solute and divide this by the distance moved by the solvent).

Testing for gases

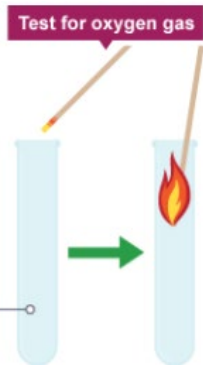
Test for hydrogen

Hydrogen gas test: to test for the presence of hydrogen gas during an investigation we would collect the gas using a trough or an upward delivery into a boiling tube. Then hold a lighted splint into the gas collected and this will be extinguished with a pop sound.



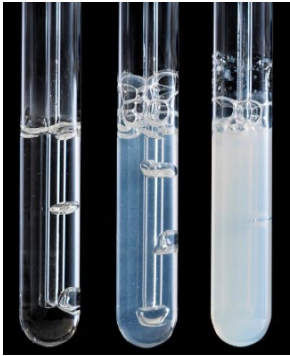
Test for Oxygen

Oxygen gas test: to test for the presence of oxygen gas during an investigation we would collect the gas using a trough or an upward delivery into a boiling tube. Then hold a glowing splint (made by blowing out a lighted splint) into the gas and this will relight.



Test for carbon dioxide

Carbon dioxide gas test: to test for the presence of carbon dioxide we can bubble the gas through limewater, and this will turn the limewater cloudy. It does not tell us how much has been produced.



Test for chlorine

Chlorine gas test: to test for the presence of chlorine we can place damp litmus paper in the chlorine gas, and it will become bleached (white). Chlorine is a toxic gas; safety precautions are a must.



## Practice Knowledge Quiz Questions

1. What is the difference between a pure and impure substance?
2. What is a formulation?
3. What apparatus do we use to measure temperature?
4. What is the state symbol for gases?
5. What apparatus do we use to measure time?
6. Write a method on how you would test for the presence of oxygen when hydrogen peroxide breaks down into water and oxygen.

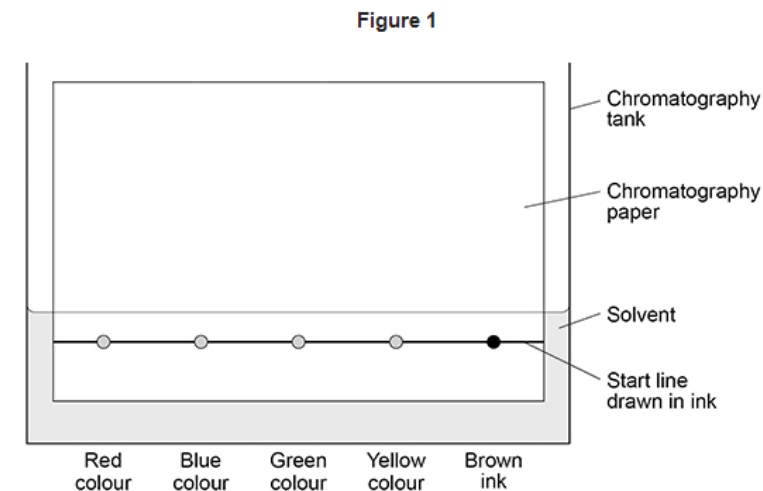
## Tasks

1. Draw a quick diagram for the four gas tests and makes labels for the equipment and a brief discussion on how you would complete each test.
2. Find and fix the following statements
  - A baseline on chromatography paper is drawn at the top of the paper.
  - A baseline on chromatography is drawn in pen.
  - The stationary phase is the solvent.
  - The mobile phase is the ink.
  - To calculate the R<sub>f</sub> value you must divide the distance moved by the solvent by the distance moved by the solid.

Maths: the distance moved by a solvent is 12cm. The distance moved by solute A is 8cm and the distance moved by solute B is 3 cm. Calculate the R<sub>f</sub> values for each of the solutes on the chromatogram.

A student investigated the colours in a brown ink using chromatography.

(a) **Figure 1** shows the apparatus used.



Give **two** errors made by the student.

Describe the problem each error would cause.

Error 1 \_\_\_\_\_

Problem 1 \_\_\_\_\_

Error 2 \_\_\_\_\_

Problem 2 \_\_\_\_\_



# Y9 Science Physics; Kinetic Energy, Power, Efficiency



## A. Power

Power is the rate that energy is transferred. It is measured in Watts, W or kilowatts, kW. (1kW = 1000W)

$$\text{Power} = \text{Energy} \div \text{Time}$$

$$P = E \div t$$

P=Power ( unit: Watt, W)  
E=Energy (unit: Joules, J)  
t= time ( unit: second, s)



Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed.

The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material.

Metals are the best conductors of thermal energy. Non-metals are the best insulators of energy.



## WORKED EXAMPLE

An electrical appliance uses 300J of energy in 1 minute. What is the power of this appliance?  
Don't forget that 1 minute is 60 seconds

## SOLUTION

$$P = E \div t$$

$$P = 300 \div 60$$

$$P = 5W$$

## C. ENERGY AND EFFICIENCY

**Efficiency= Useful output energy transferred by the device**

**USEFUL ENERGY-** **Total input energy supplied to the device** This is the energy transferred to where it is wanted in the way that is wanted.

**WASTED ENERGY-** This is the energy that is not usefully transferred. Whenever energy is transferred for a purpose in any system, some of the energy is transferred usefully. The rest is **dissipated** (spread out) and may be stored in less useful ways.

A kettle transfers energy from electrical to thermal, they are designed to be efficient and not waste energy.



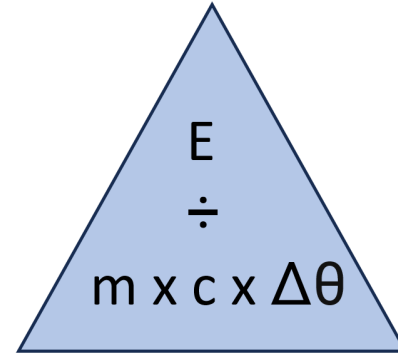
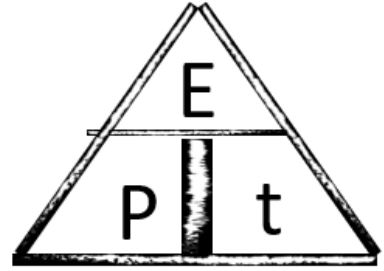
$$KE = \frac{1}{2}mv^2$$

**M= Mass (kg)**  
**V= velocity (m/s)**  
**KE= Kinetic energy**

**KINETIC ENERGY-** This is the energy an object has because of its motion, depends on its mass and speed.

# Y9 Physics Kinetic Energy, Power, Efficiency & RPA specific heat capacity.

## KO quiz



- What is power?
- Rearrange the equation for time ( t ).
- How much power does a light bulb use if it converts 36,000,000J of energy in 1 hou. .
- (1 hour = 60 minutes, 1 minutes = 60 seconds)
- What is specific heat capacity?
- Rearrange the equation triangle to calculate specific heat capacity ( C )
- What are the best conductors of energy?
- What non-metals such as wool and fibreglass make the best\_\_\_\_\_.
- Give an example of an object with kinetic energy
- What is the wasted energy of a television?
- What is the useful energy transferred by an iPhone?
- An electric motor is used to raise an object. The object's energy stored increases by 60J when the motor is supplied with 200J of energy by an electric current. Calculate the percentage efficiency of the motor.