



JABchem



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Intermediate 1
Int 1
Chemistry



Section 10

Effect of Chemicals on Plant Growth

Intermediate 1 Chemistry Unit 3: Chemistry And Life

Section 10: Effect of Chemicals on Plant Growth

LO	Lesson	Text Book	Learning Outcome	Int1 Only
1	10.1	p149	The yield of healthy crops can be reduced in the following ways: a) crops are eaten by pests, e.g. insects and slugs b) bacteria and fungi can cause plants to become diseased c) weeds can inhibit growth of plants by using up essential substances in the soil.	
2	10.2	p149	Pesticides are used to control pests, fungicides prevent diseases and herbicides kill weeds.	
3	10.2	p150	Pesticides are toxic and so must be used with care.	
4	10.2	p150	Natural predators can also be used to safely control pests.	
5	10.3	p151	Nitrogen, phosphorus and potassium are essential elements for healthy plant growth.	
6	10.3	p151	These elements are taken in through the roots of plants as compounds which are in solution.	
7	10.3	p152	In areas of natural vegetation, decay of vegetable and animal remains returns all essential elements to the soil.	
8	10.3	p152	Harvesting of crops prevents the natural return of essential elements to the soil.	
9	10.4	p152	Fertilisers are added to the soil to restore essential elements.	
10	10.4	p152	Examples of natural fertilisers include compost and manure.	
11	10.4	p152	Increased demand for food has resulted in the use of artificial fertilisers.	
12	10.5	p152	Artificial fertilisers are made by the chemical industry.	
13	10.5	p153	The major artificial fertilisers are ammonium, nitrate, phosphate and potassium compounds.	Int1
14	10.5	p152	To be effective, fertilisers must be soluble in water.	
15	10.6	p154	The extensive use of nitrate fertilisers may have increased the levels of nitrate in rivers and lochs, and the public water supply.	
16	10.6	p155	The presence of large quantities of nitrates can leave the water lifeless.	
17	10.7	p156	Some plants such as clover, beans and peas have root nodules in which nitrogen from the air is converted into nitrates.	Int1

10.1

Damage To Plants & Crops

a) **Copy** the following passage into your jotter.

The human race is getting bigger and bigger. There are around 6.6 billion people on Planet Earth. (6.6billion = 6 600 000 000)



We need to grow enough food for everyone on Earth to prevent famine and people starving.

- Farmers need to grow as much plant crops as possible
- Farmers try to reduce any damage to crops as they are growing.

b) **Copy** the following table into your jotter.

Source of Problem	Type of Damage to Crops
	Crops are eaten by pests
	Plants can become diseased
	Reduce growth of crops by using up all the essential substances in the soil.

c) Use the following wordbank to **complete** your table in your jotter.

<small>wordbank</small>		
Weeds	Bacteria & Fungi	Insects & Slugs

a) **Copy** the following passage into your jotter.

There are different ways to maximise the amount of crops you can grow. This is done by controlling the problems that damage the crops.

b) **Copy** the following table into your jotter.

Treatment	How It Protects Crops
	Used to control/kill pests like insects & slugs
	Prevent diseases like fungi and bacteria which kill plants
	Kills weeds which reduce crop growth

c) Use the wordbank to **complete** your table.

wordbank		
Fungicides	Herbicides	Pesticides

d) **Copy** and **complete** the following sentences in your jotter.

- i. Pesticides must be used carefully as they are
- ii. It is much better for the environment if pests numbers are reduced by being eaten by their natural predator
 - Greenfly are eaten by
 - Slugs are eaten by



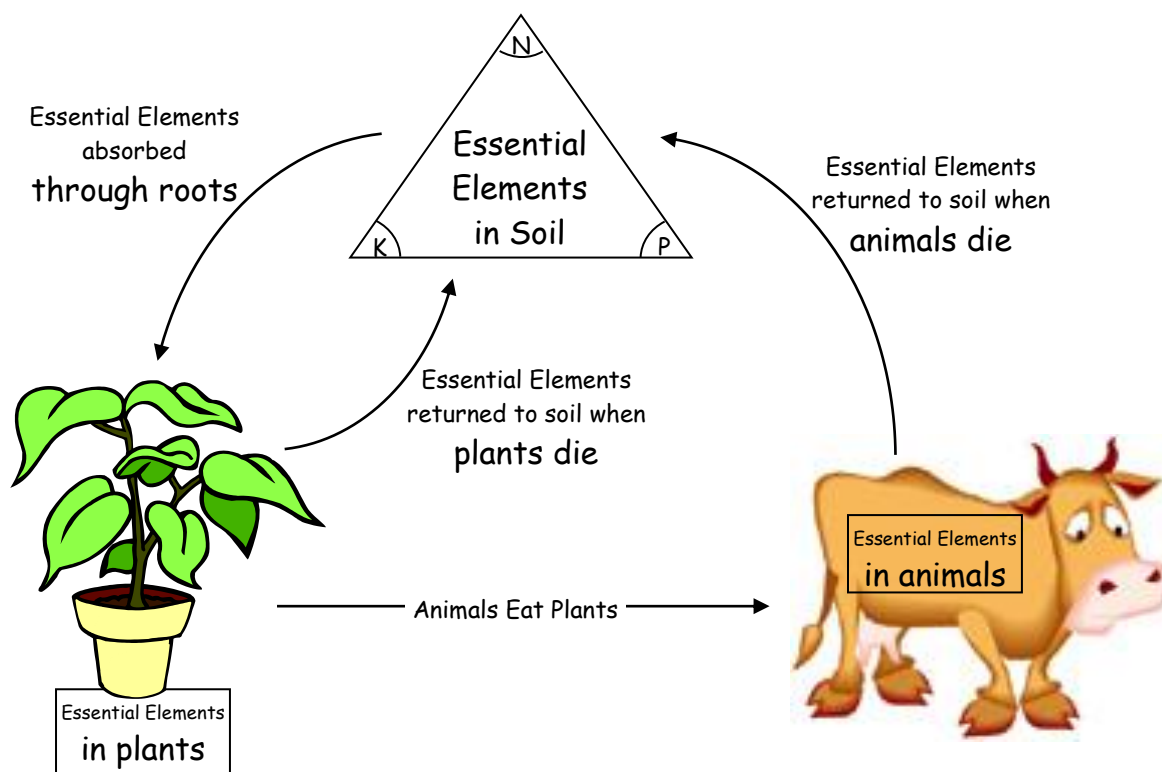
a) **Copy** the following passage into your jotter.

Plants take up all the essential chemicals they need through their roots in the soil. Then three essential elements all plants need for health plant growth are:

Element Symbol	Element Name	Reason (no need to learn)
N	Nitrogen	Root Development and Leaf Growth
P	Phosphorus	Regulates leaf development and size
K	Potassium	Rate of Plant Growth

- These elements are absorbed in their compound form from the soil.
- These compounds must be soluble in water if they are to be absorbed by the roots of plants.

b) **Collect** a copy of the following diagram and **stick** it into your jotter.



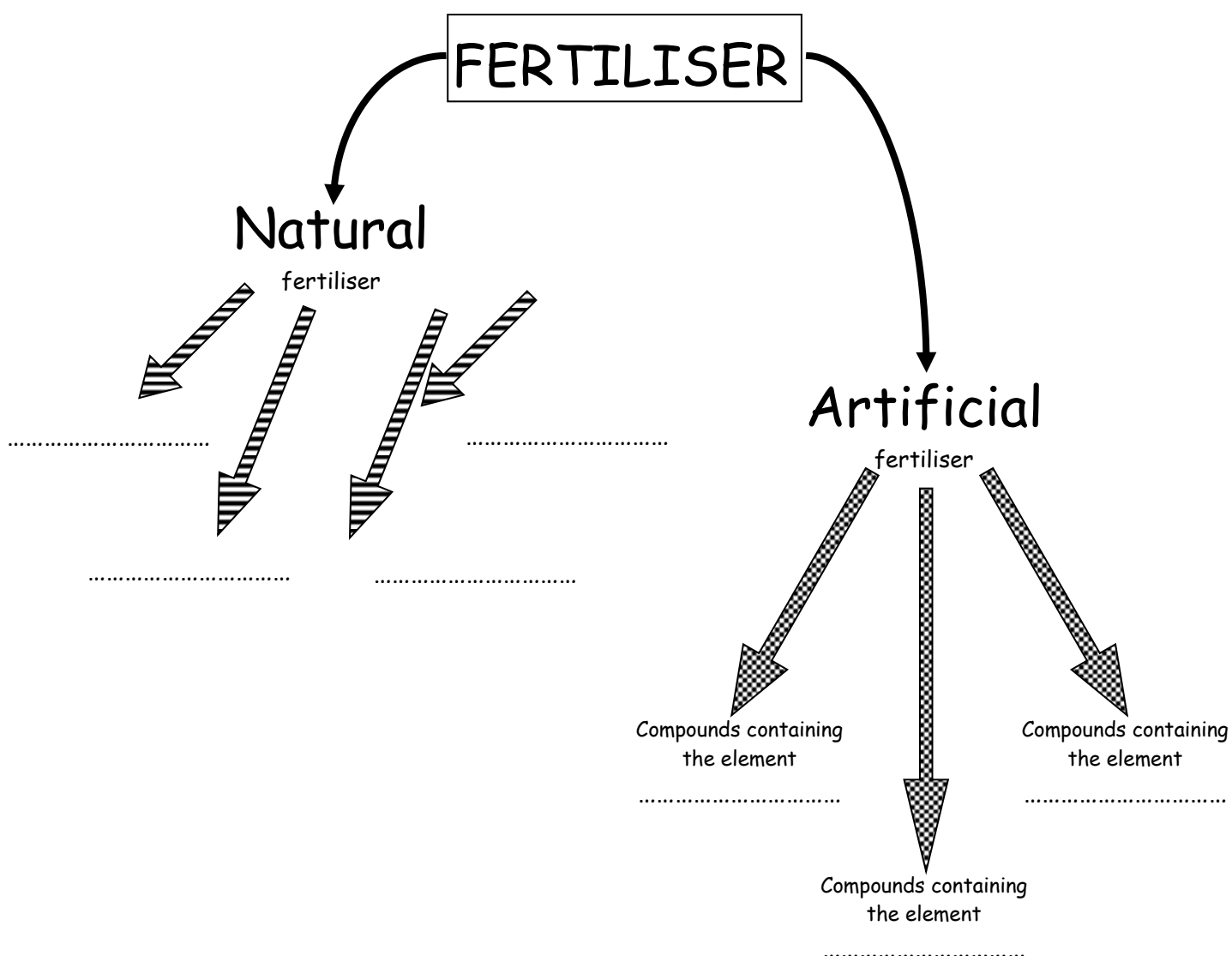
a) **Copy** the following passage into your jotter.

Harvesting crops for food removes the essential elements from the soil. This can reduce next year's crop due to lack of essential elements in the soil.

Fertilisers are added to soil to restore (top up) the amount of the essential elements nitrogen, phosphorus and potassium (N P K) in the soil.

Increased demand for food has meant an increased use of fertilisers to replace the essential elements and allow more and more food to be grown.

b) **Copy and complete** the following flow chart into your jotter.



a) **Copy** the following passage into your jotter.

Artificial fertilisers are made by the chemical industry as there are not enough of natural fertilisers available to meet demand.

To be effective a fertiliser must be soluble in water because it must be in solution to be absorbed by the roots of plants.

Fertilisers are soluble compounds containing *one or more* of the following essential elements:

- Phosphorus
- Potassium
- Nitrogen (NB: ammonium compounds contain nitrogen)

b) **Copy** and **complete** the following table into your jotter.

- Look at the compound name and decide if the compound contains the elements: nitrogen, phosphorus or potassium
- Look up page 4 of the data booklet to check the compounds solubility
- If the compound is soluble and contains N, P or K the compound can be used as a fertiliser

Compound	Compound contains			Solubility		Used as Fertiliser
	Nitrogen (N)	Phosphorus (P)	Potassium (K)	Soluble	Insoluble	
potassium sulphate	x	x	✓	✓	x	yes
sodium nitrate						
calcium phosphate						
ammonium phosphate				✓	x	
potassium nitrate						
ammonium sulphate				✓	x	
ammonium nitrate				✓	x	
iron carbonate						

a) **Copy** the following passage into your jotter.

Fertilisers are *soluble* in water and can be washed into rivers, lochs and the public drinking water supply.

Heavy rain can dissolve artificial fertilisers e.g. nitrate compounds. This can increase the nitrate levels in rivers, lochs and the public drinking water supply.

Large quantities of nitrates in rivers and lochs can leave the water lifeless:

- Nitrates encourage algae to grow fast
- Algae use up all the oxygen in the water (at night!)
- Lack of oxygen in the water can kill all the fish which live there.

b) **Watch** the video on pollution.

a) **Copy** the following passage into your jotter.

Some plants (called leguminous plants) can convert nitrogen gas from air into the nitrate compounds necessary for plant growth.

This process is known as *fixing* nitrogen.

- Fixing nitrogen takes place in root nodules
- Process is carried out by special nitrifying bacteria
- Clover, bean family and pea family plants carry out this special way of plants getting enough nitrogen to grow healthily.

Access 3 Level Revision Questions

1. Which of the following is an essential element for plants?

sulphur or phosphorus

2. Which of the following compounds could be used as a fertiliser?

sodium phosphate or calcium phosphate

3. Compost is a

natural fertiliser or artificial fertiliser

4. Fertilisers are designed to be soluble so the chemicals can be

taken up by plant roots or washed into rivers by rain

5. Pesticides can be toxic so they should be

used as much as you need or handled with care

6. The chemical industry make

natural fertiliser or artificial fertiliser

7. Which of the following compounds could be used as a fertiliser?

potassium sulphate or calcium carbonate

8. Which of the following compounds could be used as a fertiliser?

MgCl₂ or NH₄NO₃

9. Pesticides can be used to control

insects or weeds

10. Fertilisers are used more and more because

world population is decreasing or world population is increasing

1. Plant diseases are treated with

- A. Herbicides B. Fungicides C. Pesticides D. Fertiliser

2. Slugs damage plants and are treated with

- A. Herbicides B. Fungicides C. Pesticides D. Fertiliser

3. Weeds can be killed by treating with

- A. Herbicides B. Fungicides C. Pesticides D. Fertiliser

4. Which of the following could not be used as a fertiliser?

- A. potassium phosphate B. potassium nitrate C. calcium nitrate D. calcium phosphate

5. Which of the following could not be used as a fertiliser?

- A. potassium nitrate B. sodium nitrate C. potassium chloride D. sodium chloride

6. Which of the following is not an essential element?

- A. platinum B. phosphorus C. potassium D. nitrogen

7. Which of the following is not a natural fertiliser?

- A. manure B. compost C. lime D. dung

8. Which plant cannot convert nitrogen gas into nitrate compounds?

- A. clover B. pea family C. potato D. bean family

9. Why does harvesting crops mean fertilisers need to be used?

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10. Why are weeds bad for the yield of crops produced?

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