

Chemistry guide set 5

Item 1

Category type of product

Elders preferred foods without food additives while the youth foods with food additives.

How it works

Food additives serve various functions such as;

- Colouring is added to improve and make food look attractive.
- Preservative to slow down the decomposition caused by moulds and maintain the quality of food dry salt.
- Sweeteners to add taste
- Flavouring agents added to food to improve aroma or taste.
- Enzyme preparations to boost biochemical reactions.

The food additives are therefore added to food to improve the safety, freshness, flavor, taste, texture or appearance of food.

Danger or side effects of product and mitigation.

The materials like plastics used in food packaging can indirectly become part of food by adding micro plastics to the food and can cause cancer.

Mitigation

- Avoid using plastics to package foods.
- Use glass or tin cans to package food stuffs.
- Consume unprocessed foods

OR

Food additives like colouring in the long run cause cancer of the blood.

Mitigation

- Use natural colouring substances.
- Consume natural foods/non processed foods like fruits.

Evaluation of product/process

Both synthetic and natural food additives add value to the foods by improving the food appearance, colour, taste, aroma/flavours or texture. However, most natural foods do not look tasty and attractive or lack the flavor compared to processed.

Natural foods and fruits get spoilt easily while processed can last for long in storage (or equivalent)

Item 2

Category of element, compound, substance or material with a reason

The materials can be categorized into metals because they are hard, strong, shiny with attractive appearance and non-biodegradable while others are non-metals basically plastics because they are light, durable, cheap and non-biodegradable.

Properties or predictions of properties of element, compound, substance or material.

Iron

- Is strong and hard to support weight of tents.
- Non-biodegradable thus does not rot or get affected by bacteria.
- Not very heavy so is easy to transport.
- Is ductile and malleable so can be easily be shaped.

Aluminium

- Is light hence easy to carry.
- Has high tensile strength so resists damage.
- Is shiny and attractive to give nice appearance.
- Is malleable so can be drawn into thin sheets for wrapping.
- A good conductor of heat and electricity
- Resistant to attack by oxygen and water hence stable.

Plastics like poythene, pulyving chloride Perspex bakilite

- Is light hence easy to move/carry
- Hard and strong so can support weght.
- Water proof so does not allow leakage.
- Flexible and soft can resist breakage
- Non-biodegradable so is not affected by bacteria or rot
- Long lasting
- Easy to colour

NB Consider glass clay and ceramics.

Uses of element, compound, substance or material/application/quantity of matter le moles

Iron to make support pillars for tents.

Aluminium for utensils like saucepans, wrapping material/take away plates/dishes

Plastics;

- For single use cups, forks, spoons
- Tents
- Jerrycans
- Plates

Ceramic or clay for making plates and cups.

Glass for plates jugs, cups etc

Impact on the environment/pollution by element, compound, substance, or material and mitigation.

Iron

Pieces of iron are non-biodegradable and cause soil degradation by depletion of nutrients

Aluminium

Depletes soil nutrients when poorly disposed rendering soil infertile

Mitigation for iron and aluminium

Recycle to make other materials

Plastics are non-biodegradable so pollute the environment

Mitigation recycle the plastic waste

Formulate laws banning use of plastics or littering

Item 3

Raw materials

Sulphur

Process of production

To make ammonium sulphate, sulphuric acid and ammonia are required.

Sulphuric acid is manufactured in the contact process from sulphur

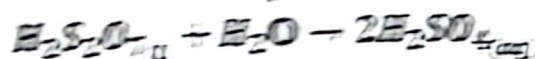
Sulphur is burnt in air to form sulphur dioxide



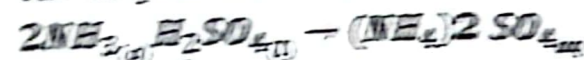
The Sulphur dioxide is cleaned dried and mixed with excess air then passed over heated vanadium (V) oxide catalyst at a temperature of about 500°C to form sulphur trioxide. The reaction is reversible and exothermic.



Sulphur trioxide is dissolved in concentrated sulphuric acid to form oleum. Oleum is diluted with water to obtain sulphuric acid.



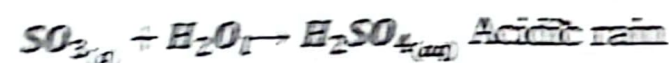
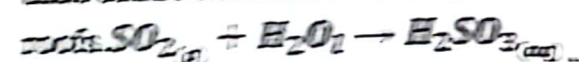
The sulphuric acid reacts with ammonia to form ammonium sulphate.



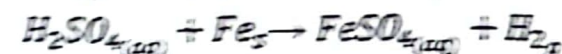
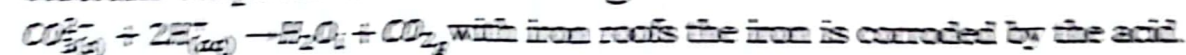
Finally the fertilizer is granulated and sold to farmers.

(c) side effects of the process of production and mitigation

Air pollution by exhaust fumes some of which contain acidic pollutant gases that cause acidic rain which crumble rocks lower soil PH and corrode iron



The acid can react with calcium carbonate in rocks to form calcium sulphate thus crumbling the rock.



mitigation

- o Fitting catalytic converters in exhaust pipes to convert the acidic gas wastes into non-harmful products.
- o Acid burns due to accidents/acid spills because sulphuric acid is corrosive

Mitigation

- o Protective wears

- Global warming by fossil fuel wastes from running machines and vehicles working in the industry. The high carbon dioxide levels in air cause global warming due to heat reflected back on the earth crust which can lead to climate change in the long run.

Mitigation

- Plant trees to absorb carbon dioxide.
- Use non fossil fuel sources of energy such as electric machines and vehicles.
- Use catalytic converters

Social benefits

- Employment opportunities earn income better living standards.
- Build schools, improved literacy levels, a skilled and educated community.
- Builds hospitals, improved medical services, a healthy population.
- Improved road network improved transport to and from the market/mobility improved.

Item 4

Raw materials

Trees

(b) Process of production

Mature trees are cut into short logs which are piled together in an orderly manner.

The logs are covered with leaves then soil is heaped on the logs. A few openings are left to let in air so that firewood is ignited to start the destructive distillation of wood.

Once the logs have been ignited the holes are closed so that the process occurs in limited air

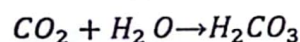
The distillation occurs slowly for 3-4 days until smoke stops being evolved. It is left to cool and soil is carefully removed. Charcoal is obtained and packed for sale

(c) side effects of the process of production and mitigation

Soil degradation, the soils are baked by heat from the wood killing micro organism; humus is destroyed and minerals burnt. The soil crumble structure is spoiled (allow loss of fertility)

Mitigation

Discourage charcoal burning and seek for alternative sources of energy. Greenhouse gas emissions which cause greenhouse effect. Carbon monoxide causes air pollution carbon dioxide global warm acidic rain. $C + \frac{1}{2}O_2 \rightarrow CO$



Mitigation

Re-afforestation to absorb the greenhouse emissions

Put up laws prohibiting charcoal burning

Social benefits

Employment opportunities; the community benefits income and better standards of living

OR equivalent

Item 5

(a) Identity of category of natural resource, reason and example.

The natural resources can be classified into renewable and non-renewable. The renewable natural resources can be sustained such as water air soil and vegetation.

The non-renewable resources get exhausted when harnessed and can not be replenished such as fossils fuels rocks and minerals.

(b) Composition of natural resource

- Water chemically consists of oxygen and hydrogen elements. It also has living organisms and dissolves substances.
- Tree have carbon, hydrogen and oxygen as the major constituents elements.
- Additionally protein tissues have nitrogen, sulphur or phosphorus.

Air consists of gases like oxygen carbondioxide nitrogen water vapour and pollutants.

- Soil has organic components like humus, mineral elements, gases, water and living organisms. The organic components have carbon, hydrogen and oxygen.

Gases include oxygen, nitrogen carbondioxide and water vapour

(c) Impact of natural resource on the environment, how it occurs and mitigation.

Human activities impact the natural resource negatively for example

- Farming near the river banks may have artificial fertilizers from the farm land washed into the water body adding fertilizers which can cause entrophication and subsequent challenges such as anaerobic conditions resulting in death of fish.
- Rearing animals near the water body pollutes the water as animals excrete get washed into the water
- Clearing vegetation for farm land leaves the soil bare and subject to erosion.
- Removal of vegetation also leads to loss of habitats for some species which reduces on species diversity.
- Lowering of soil PH by hydrolysis of inorganic fertilizers reducing on plant growth.

Mitigation

- Reduce use of artificial fertilizers.
- Use mulching to avoid soil erosion or terracing
- Farm far away from the wetland over (river shower)
- Do not dispose animal excreta into the water body to reduce pollution.

- Planting trees at the shores to reduce erosion.
- Re afforestation to mitigate global warming or formation of acidic rain by high levels of carbondioxide in atmosphere due to cutting down vegetation.
- Practice zero grazing to prevent disposal of animals excrete into the water body.
- Evict farmers from cultivating wetlands to prevent disturbing the water table and water cycle as the plants contribute to the water cycle through evapotraspiration
- Conversion of animals excreta into brickets biogas for cooking or manure.

Benefit/Importance of natural resource.

- Water contains oxygen which is required for respiration of aquatic organisms.
- Water is habitat to organisms like fish
- Forest contributes to the water cycle and prevention of greenhouse effect
- Forest is important is preservation of biodiversity
- Soil is home for soil organisms
- Soil has minerals for plant growth.

Item 6

(a)Identity of category of natural resource reason and example.

In John's house the natural resource affected is air which is renewable natural resource because it can be replenished.

(b) Composition of natural resource

Air consists of gases like nitrogen oxygen, carbondioxide inert gases, water vapour and pollutants dust and bacteria.

(c) Impact of the natural resource on the environment how it occurs and mitigation.

- Air contains gases like oxygen which supports burning, cooking is limited air leads to incomplete combustion of carbon based fuels which adds carbonmonoxide to air polluting it. $C_s \frac{1}{2} O_{2g} \rightarrow CO_g$
- Carbonmonoxide is a respiratory poison which prevents blood carrying oxygen and can result into death by suffocation.
- It is dangerous to cook in a poorly ventilated house like John's.
- Air contains oxygen for respiration. Clean air with sufficient is required in living rooms by humans for respiration in order to obtain energy for survival.

Complete combustion of carbon based fuels add carbondioxide to air raising its levels which can cause greenhouse effects such as global warming and formation of acid rain when the carbondioxide dissolves in rain water.

$CO_2 + H_2O \rightarrow H_2CO_3$ The acid rain crumbles some rocks lowers soil PH and corrodes iron roofs.

Air which is polluted by waste gases of respiration, dust and bacterial is dangerous to humans as it can cause diseases.

Mitigation live in well ventilated environment with clean air

Plant trees to reduce pollutants and refresh air by adding oxygen to it

Avoid cooking using carbon based fuels in limited air

Create a clean and conducive environment by staying in separate houses with animals

Use clean energy such as electricity to avoid green house emissions into the air.

Benefits importance of natural resource

Air has oxygen gas in it which organisms need for their respiration

Plants need air for respiration and also carbon dioxide for photosynthesis