Fertilizers and testing for nitrates essay sample

Mined inorganic fertilizers have been used for many centuries, whereas chemically synthesized inorganic fertilizers were only widely developed during the industrial revolution. Increased understanding and use of fertilizers were important parts of the pre-industrial British Agricultural Revolution and the industrial Green Revolution of the 20th century

Fertilizers (also spelled fertilisers) are compounds given to plants to promote growth; they are usually applied either via the soil, for uptake by plant roots, or by foliar feeding, for uptake through leaves. Fertilizers can be organic (composed of organic matter), or inorganic (made of simple, inorganic chemicals or minerals). They can be naturally occurring compounds such as peat or mineral deposits, or manufactured through natural processes (such as composting) or chemical processes (such as the Haber process).

Fertilizers typically provide, in varying proportions, the three major plant nutrients (nitrogen, phosphorus, and potassium), the secondary plant nutrients (calcium, sulfur, magnesium), and sometimes trace elements (or micronutrients) with a role in plant nutrition: boron, chlorine, manganese, iron, zinc, copper, and molybdenum.

In the past, both organic and inorganic fertilizers were called “ manures,” but this term is now mostly restricted to man-made manure.

Though nitrogen is plentiful in the Earth’s atmosphere, relatively few plants engage in nitrogen fixation (conversion of atmospheric nitrogen to a biologically useful form). Most plants thus require nitrogen compounds to be present in the soil in which they grow.

Justus von Liebig invented fertilziers He is known as the “ father of the fertilizer industry” for his discovery of nitrogen as an essential plant nutrient, and his formulation of the Law of the Minimum which described the effect of individual nutrients on crops.

Fertilizer adds nutrients and texture to soil that needs to provide nutrients to trees, vegetables, herbs, shrubs and flowers. There are several ways to categorize fertilizer, and the most basic is whether it is organic or inorganic. It also can be classified according to its ingredients, whether it is solid or liquid and by its particular actions, such as slow-releasefertilizers that dissolve and release their nutrients slowly. The choice of fertilizer that is used typically depends on the nature of the soil, such as whether it is acidic or alkaline; sandy, clay or rocky; and weak or rich.

Organic

Organic fertilizer is all natural and includes things such as bat guano, compost, peat moss, wood ash and manure. These are general soil amendments. They don’t burn or harm plants, and they can have long-term positive effects on the soil without damaging groundwater. Organic fertilizer, however, generally has lower nutrient concentrations than inorganicfertilizers.

Inorganic

Inorganic fertilizer is man-made and typically comes as a powder, pellets, granules or a liquid. Examples of inorganic fertilizers are chemical additives that are designed for plants to directly absorb, such as nitrogen (N),

phosphorus (P) and potassium (K). These three essential elemental nutrients should naturally occur in healthy soil, but some plants require more of them. Other chemicals that might be included in inorganic fertilizers include calcium, sulfur, iron, zinc and magnesium.

Investigation

Table of Results

Substance

Flame Test

Sodium Hydrioxide test

Litmas test

Silver nitrate test

Barium nitrate test

Brown ring test

A

no observable change.

no observable change.

Red to blue

No reaction

no observable change.

Brown

B

no observable change.

no observable change.

Red to blue

no observable change.

White precipitate

no observable change.

C

Green

no observable change.

no observable change.

no observable change.

White precipitate

no observable change.

D

Brick Red

no observable change.

no observable change.

no observable change.

no observable change.

Brown

E

Lilac

no observable change.

no observable change.

no observable change.

White precipitate

no observable change.

F

Lilac

no observable change.

no observable change.

White precipitate

no observable change.

no observable change.

Method

Flame Test

First dip a wooden splint into each of the sample of solution, then the colour of a gas flame is observed as the sample is heated by the Bunsurn Burner. Some of the solution gave a colour and some didn't then the colour of the flame is compared against the flame colours known to be associated with the metal.

Litmus Test

We placed a piece of damp red Litmus Paper over the solution, after adding some sodium hydroxide to the sample. We then observe any colour change. Litmus indicator solution turns red in acidic solutions and blue in alkaline.

Silver nitrate Test

Make a solution sample using distilled water, acidify with nitric acid, add a few drops of silver nitrate solution, if a precipitate forms add ammonia solution

Barium Test

Make a solution sample using distilled water, acidify with nitric acid, add a few drops of barium chloride solution

Brown ring test

A common nitrate test, known as the brown ring test can be performed by adding iron(II) sulfate to a solution of a nitrate, then slowly adding concentrated sulfuric acid such that the sulfuric acid forms a layer below the aqueous solution. A brown ring will form at the junction of the two layers, indicating the presence of the nitrate ion. Note that the presence of nitrite ions will interfere with this test.

Flame test

Sodium Hydroxide test

Litmas Test

Silver nitrate test

Barium nitrate test

Brown ring test

Annonium Nitrate

no observable change.

no observable change.

Red to Blue

no observable change.

no observable change.

Brown

Ammonium Sulphate

no observable change.

no observable change.

Red to Blue

no observable change.

White precipitate

no observable change.

Copper Sulphate

Green

no observable change.

no observable change.

no observable change.

White precipitate

no observable change.

Calcium Nitrate

Brick red

no observable change.

no observable change.

no observable change.

no observable change.

Brown

Potassium Sulphate

Lilac

no observable change.

no observable change.

no observable change.

White precipitate

no observable change.

Potassium Chloride

Lilac

no observable change.

no observable change.

White precipitate

no observable change.

no observable change.

Risk Assessment

When doing the brown ring test eye protection must be worn, However it is a low risk experiment if proper precautions are taken and the instructions are adhered to. Wear lab gloves andeye protection.

Specific activity

Hazards/consequences

Control measures

silver nitrate

silver nitrate is CORROSIVE, gets on your skin or Causes burns to skin, eyes and body tissues. Eye contact causes damage which may result in permanent loss of vision.

Eyes: Wear appropriate protective eyeglasses

Skin: Wear appropriate gloves to prevent skin exposure.

Open flame

Fire, burns

Fire extinguisher, hair tied back

Barium nitrate

Eye: Causes eye irritation.

Skin: Causes skin irritation. May be harmful if absorbed through the skin.

Eyes: Wear appropriate protective eyeglasses

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear a chemical apron. Wear appropriate clothing to prevent skin exposure.

Also when doing tests like these strick hygiene is needes for example wash hands after doing the experiment, cover cuts ect.