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Environment

Air Pollution
Air pollution refers to the presence of harmful substances in the atmosphere that negatively affect the environment and human health. These pollutants, which include gases like carbon dioxide, nitrogen oxides, sulfur dioxide, and particulate matter such as dust, smoke, and industrial emissions, can originate from both natural and human activities. Major sources of air pollution include the burning of fossil fuels, industrial processes, vehicle emissions, and agricultural practices. The consequences of air pollution are far-reaching, contributing to respiratory diseases, global warming, acid rain, and the depletion of the ozone layer, making it a critical issue for environmental sustainability and public health.

Acholi	English
cilo	Dust
iro	Smoke
yamo	Air
two	diseases
lieto lobo	global warming
kot omiyo	acid rain
Ka yamo ma wang	ozone layer

Pollution Control
Pollution control refers to the strategies and measures implemented to reduce or eliminate the release of harmful pollutants into the environment. These methods aim to minimize the impact of pollutants on air, water, soil, and ecosystems. Common pollution control techniques include the use of filters and scrubbers in industrial plants, waste management practices, recycling, emission standards for vehicles, and wastewater treatment. Governments and organizations enforce regulations to control pollution, while industries adopt cleaner production methods to reduce their environmental footprint. Effective pollution control is essential for preserving natural resources, protecting public health, and ensuring sustainable development.

Acholi	English
yamo	Air
pii	Water
ngom	Soil
woo	Noise
odur	waste

Contamination
Contamination occurs when harmful substances, such as chemicals, toxins, or microorganisms, are introduced into natural environments, food, water, or other materials, making them unsafe or unfit for use. Contaminants can come from various sources, including industrial activities, agricultural runoff, improper waste disposal, and accidental spills. For example, water contamination can result from chemicals seeping into groundwater, while food contamination may occur through improper

handling or exposure to hazardous materials. The effects of contamination can be detrimental to both human health and ecosystems, leading to diseases, environmental degradation, and loss of biodiversity. Controlling contamination requires careful management, regulation, and remediation efforts to minimize risks and protect both the environment and public health.

Acholi	English
pii	Water
ngom	Soil
kuon	Food
yamo	Air

Water
Water is an essential resource for all life forms on Earth, playing a vital role in ecosystems, human health, and economic activities. It covers about 71% of the Earth's surface, mostly in the form of oceans, with the remainder found in rivers, lakes, glaciers, and groundwater. Water is crucial for biological processes, including hydration, nutrient transportation, and temperature regulation in living organisms. It also supports agriculture, industry, and energy production. However, the availability of clean, fresh water is limited, and pollution, overuse, and climate change threaten this precious resource. Protecting water quality and ensuring sustainable water management are critical for maintaining human well-being and environmental balance.

Acholi	English
kado	Salinity
tek pii	Water Hardness
ngoyo wang	Dissolved Oxygen
leng pii	Water Purification

Agriculture

Pest
Pests are organisms that negatively impact human activities, particularly in agriculture, by damaging crops, livestock, and food storage. They can be insects, weeds, rodents, or fungi. Pests reduce crop yields, decrease the quality of produce, and can even spread diseases to plants, animals, and humans. Managing pests is a critical aspect of agriculture, public health, and food storage.

Acholi	English
okok	termite
kwidi	bugs
otanga	grasshopper
ocene	long-horned grasshopper
tut	bark beetle
oyoo	rat
obonyo	locust
ongulu ongulu cet	beetle
kwidi	caterpillar
lokirkir	crickets
angiyu	mosquito

Pest control
Pest control refers to the regulation or management of pests, typically in agricultural fields, homes, or businesses, to prevent damage to crops, property, and public health. The goal is to reduce or eliminate pest populations using various methods that range from chemical and mechanical means to biological and cultural approaches. Effective pest control helps maintain the quality and quantity of agricultural products, ensures food safety, and reduces health risks associated with pests.

Acholi	English
tongo bwe	dig anti hill
keto buru	putting ash
keto kado	putting salt
yat lobal cam	pesticide
loco pit	rotates crop
moko	trap
limo poto	monitoring

Soil Chemistry
Soil chemistry is the study of the chemical composition, reactions, and properties within soils. It plays a crucial role in determining soil fertility, plant growth, and the overall health of agricultural ecosystems. The interaction of chemical elements and compounds in soil affects nutrient availability, pH levels, and the soil's ability to support crops.

Acholi	English
apita	organic
kene	mineral
pii	Water
yamo	gas

Plant Growth
Plant growth refers to the process by which plants increase in size and mass, developing roots, stems, leaves, and reproductive structures. This process is driven by a combination of biological, chemical, and environmental factors, including nutrient availability, water, light, temperature, and genetics. Understanding the mechanisms behind plant growth is essential for agriculture, horticulture, and ecosystem management.

Acholi	English
twi	germination
dongo	growth
ler	root
mac	light
pii	water
mac	light
ping	temperature

Environmental
The **environment** encompasses all living and non-living things around us, including air, water, land,

plants, animals, and human activities. Environmental science is the study of how these elements interact and how human activities impact natural ecosystems. Understanding the environment is crucial for ensuring sustainable development, protecting ecosystems, and addressing global challenges such as climate change, pollution, and resource depletion.

Acholi	English
odur	Waste
ngom	land
kwo	Living Organisms
okwok	pollution
pii	water
lobo	land
pito	plants
lee	animals
dano	human

Soil

Soil Composition and Properties
Soil composition and properties refer to the physical and chemical makeup of soil, which significantly influences its ability to support plant life and sustain ecosystems. Soil is primarily composed of mineral particles (sand, silt, and clay), organic matter from decomposed plants and animals, water, and air. The proportions of these components determine the soil's texture, structure, and ability to retain water and nutrients. Soil pH, which measures its acidity or alkalinity, also affects nutrient availability and microbial activity. Understanding soil composition and properties is essential for managing soil health, improving agricultural productivity, and addressing environmental challenges like erosion and contamination.

Acholi	English
yamo ngom	Soil Air
ngom pii	Soil Water
kido ngom	Soil Structure
ber ngom	Soil Texture

Soil Contamination and Remediation
Soil contamination occurs when hazardous substances, such as chemicals, heavy metals, or biological agents, are introduced into the soil, degrading its quality and posing risks to ecosystems and human health. Common sources of contamination include industrial waste, agricultural pesticides, and improper disposal of hazardous materials. These pollutants can disrupt plant growth, contaminate groundwater, and enter the food chain, leading to widespread environmental and health impacts. Soil remediation refers to the various methods used to clean or neutralize contaminated soil, such as bioremediation (using microorganisms), phytoremediation (using plants), and chemical treatments. Effective remediation is crucial for restoring soil health, ensuring safe land use, and preventing long-term environmental damage.

Acholi	English
rube ngom	Soil Contamination
nyono orube madwong	Heavy Metal Contamination

yat poto rube	Pesticide Contamination
pito ngom	Soil Remediation

Soil Organic Matter and Decomposition
Soil organic matter (SOM) consists of decomposed plant and animal residues, microorganisms, and substances synthesized by soil organisms, playing a crucial role in maintaining soil health. As organic matter breaks down through decomposition, driven by microbes, essential nutrients like nitrogen, phosphorus, and carbon are released, improving soil fertility. The decomposition process also leads to the formation of humus, a stable organic component that enhances soil structure, water retention, and aeration. Soil organic matter regulates carbon cycling, reduces erosion, and supports biodiversity. Healthy levels of SOM are vital for productive agriculture, sustainable ecosystems, and long-term soil conservation.

Acholi	English
gin ma opito	Organic Matter
oyue	Decomposition
yweyo nuore	Carbon Cycle
ngom minyol	Soil Fertility

Air

Composition of Air
The composition of air is primarily made up of a mixture of gases that play crucial roles in supporting life and regulating the Earth's climate. The major components include nitrogen, which constitutes about 78% of the atmosphere, and oxygen, which makes up approximately 21%. Trace gases, such as argon (0.93%), carbon dioxide (0.04%), and water vapor, account for the remaining fraction. Each of these gases has unique properties and functions; for instance, oxygen is essential for respiration in living organisms, while carbon dioxide plays a key role in photosynthesis and the greenhouse effect. The balance of these gases is vital for maintaining a stable environment, and even small changes in their concentrations can significantly impact climate and air quality.

Acholi	English
liel (78%)	Nitrogen (78%)
wang (21%)	Oxygen (21%)
komebot (0.93%)	Argon (0.93%)
yweyo (0.04%)	Carbon Dioxide (0.04%)

Properties of Oxygen
Oxygen is a colorless, odorless gas that is essential for life on Earth, playing a critical role in various biochemical processes. It is highly reactive and supports combustion, making it a key player in oxidation reactions where it combines with other substances to release energy. Oxygen is crucial for respiration in living organisms, as it is used by cells to produce energy through the process of aerobic respiration. In its diatomic form (O_2), oxygen makes up about 21% of the Earth's atmosphere and is vital for the formation of ozone (O_3) in the stratosphere, which protects life by absorbing harmful ultraviolet radiation from the sun. Additionally, oxygen can form compounds with almost all elements, leading to the formation of oxides, and is involved in various industrial applications, including water treatment and metal production. Its unique properties and versatility make it indispensable for both ecological balance and technological advancements.

Acholi	English
yamo ma wang pe ki cal	Oxygen is a colorless gas
rube ki yamo mo kene, gamo mac	Highly reactive, supports combustion
tie ka malo megwa	Present in the ozone layer
rube kede yamo ma liel bino pii	Can form compounds with hydrogen (water)

Greenhouse Gases

Greenhouse gases (GHGs) are atmospheric gases that trap heat, contributing to the greenhouse effect, which is essential for maintaining the Earth's temperature and climate. The major greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and water vapor, each with distinct sources and effects on global warming. Carbon dioxide is primarily emitted through the burning of fossil fuels, deforestation, and industrial processes, while methane is released during the production and transport of coal, oil, and natural gas, as well as from livestock and other agricultural practices. Nitrous oxide emissions largely come from agricultural activities and fossil fuel combustion. Although these gases are present in trace amounts, their heat-trapping capabilities significantly impact climate change. Reducing GHG emissions is crucial for mitigating climate change and its associated effects, such as extreme weather events, rising sea levels, and disruptions to ecosystems and agriculture.

Acholi	English
ot alum alum mako lieto in piny	Greenhouse gases trap heat in the atmosphere
gin ge kelo liet lobo	They contribute to global warming
kati ki tic me wango moo ki tongo yat	Emitted from human activities like burning fossil fuels and deforestation
ot alum alum gat i piny onyoni ma pol	Greenhouse gases can remain in the atmosphere for years to centuries

Atmospheric Pressure

Atmospheric pressure is the force exerted by the weight of air molecules above a given surface, and it plays a critical role in various physical processes and weather patterns on Earth. At sea level, atmospheric pressure is typically measured at approximately 101.3 kilopascals (kPa) or 1 atmosphere (atm), but this pressure decreases with altitude due to the diminishing weight of the air above. Atmospheric pressure affects boiling points; for instance, water boils at lower temperatures at higher elevations because there is less pressure. It also influences weather systems, as changes in atmospheric pressure can indicate shifts in weather conditions, such as the approach of a storm or the clearing of skies. Furthermore, atmospheric pressure is essential for respiration in living organisms, as it drives the movement of gases in and out of the lungs. Understanding atmospheric pressure is vital for meteorology, aviation, and various scientific fields, as it impacts not only daily weather but also long-term climate patterns.

Acholi	English
yamo piny en pek ne i wi yamo malo	Atmospheric pressure is the weight of air above a surface
kelo kin piny ki kit me tic	Affects weather patterns and systems
yamo yamo ok i lieto mi liel	Influences boiling point of liquids

loco piny mi nyuto apoka poka i kin piny	Changes in atmospheric pressure can indicate weather changes

Natural Resources

Forest Resources
Forest resources encompass the diverse assets found within forest ecosystems, including trees, plants, wildlife, water, and soil. They play a vital role in maintaining ecological balance, supporting biodiversity, and regulating the climate by absorbing carbon dioxide and releasing oxygen. Forests provide essential economic resources, such as timber, fuelwood, medicinal plants, and food, supporting the livelihoods of millions. However, they face significant threats from deforestation, climate change, and unsustainable practices. Effective conservation efforts, including reforestation, sustainable management, and community involvement, are crucial to preserving forest resources for future generations.

Acholi	English
yen	timber
cam	food
yat	medicinal
apita	plants

Water Resources
Water resources refer to the natural sources of water that are essential for sustaining life, including rivers, lakes, groundwater, glaciers, and oceans. These resources are crucial for drinking, agriculture, industry, energy production, and maintaining natural ecosystems. However, water resources face significant challenges from overuse, pollution, climate change, and population growth, which lead to water scarcity and degraded water quality. Proper management, conservation practices like rainwater harvesting, pollution control, and sustainable usage are vital to ensure that water remains available and clean for current and future generations.

Acholi	English
kulo	rivers
nam	lakes
pii ite ngom	groundwater
nam	oceans

Mineral Resources
Mineral resources are naturally occurring substances found within the Earth's crust, including metals like gold, iron, and copper, as well as non-metallic minerals like limestone, gypsum, and salt. These resources are essential for various industries, playing a critical role in construction, manufacturing, technology, and energy production. Despite their importance, mineral resources are finite and face challenges such as over-extraction, environmental degradation, and geopolitical tensions over access and control. Sustainable mining practices, recycling of mineral products, and careful management are crucial to ensure that these valuable resources are available for future generations while minimizing environmental impact.

Acholi	English
jabu	gold
cuma	iron
aremo	copper
kado	salt

Renewable Resources
Renewable resources are natural resources that can be replenished naturally over time, such as sunlight, wind, water (hydropower), biomass, and geothermal energy. Unlike non-renewable resources, renewable resources are considered sustainable because they are abundant and can regenerate, making them vital for long-term energy production and environmental health. They play a key role in reducing greenhouse gas emissions and mitigating climate change by providing cleaner alternatives to fossil fuels. However, their effective use depends on technological advancements, infrastructure development, and policies promoting sustainable consumption, ensuring that these resources are harnessed efficiently without causing ecological imbalance.

Acholi	English
chieng	Solar
yamo	Wind
pii	Water
odur	Biomass

Fertilizers

Types of Fertilizers
Fertilizers are classified into two main types: organic and inorganic (synthetic). **Organic fertilizers** are derived from natural sources, such as compost, manure, bone meal, and plant residues. They release nutrients slowly as they decompose, improving soil structure and promoting the activity of beneficial microorganisms. **Inorganic fertilizers**, on the other hand, are chemically synthesized compounds, like ammonium nitrate, urea, and potassium chloride, designed to provide specific nutrients in a more readily available form. These fertilizers often contain concentrated amounts of essential nutrients, such as nitrogen (N), phosphorus (P), and potassium (K), known as the NPK ratio, which is tailored to suit different plant requirements for rapid growth and increased crop yield. While inorganic fertilizers offer quick and targeted nutrient supply, organic fertilizers contribute to long-term soil health and fertility.

Acholi	English
odur	compost
it yat	manure
lac	urea
yamo pit	nitrogen

Chemical Composition of Fertilizers
The chemical composition of fertilizers primarily revolves around the essential nutrients required for plant growth, often represented as the NPK ratio: Nitrogen (N), Phosphorus (P), and Potassium (K). **Nitrogen** is commonly supplied in the form of compounds like ammonium nitrate (NH_4NO_3), urea ($CO(NH_2)_2$), and ammonium sulfate ($(NH_4)_2SO_4$), which promote leaf and stem development. **Phosphorus** is usually provided as phosphates, such as monoammonium phosphate ($NH_4H_2PO_4$) and diammonium phosphate ($(NH_4)_2HPO_4$), which support root growth and flowering. **Potassium**, often

delivered as potassium chloride (KCl) or potassium sulfate (K_2SO_4), enhances overall plant health, disease resistance, and water regulation. In addition to NPK, fertilizers may also contain secondary nutrients like calcium, magnesium, and sulfur, as well as micronutrients such as iron, zinc, and manganese, tailored to the specific needs of the soil and crops.

Acholi	English
pit	nitrogen
dano	phospate
kado	potassium
ceng	magnesium

Fertilizer Production
Fertilizer production involves various industrial processes to synthesize or extract essential nutrients like nitrogen, phosphorus, and potassium. **Nitrogen-based fertilizers**, such as ammonia (NH_3), are typically produced through the Haber-Bosch process, which combines nitrogen from the air with hydrogen derived from natural gas under high pressure and temperature in the presence of a catalyst. This ammonia can then be processed into compounds like urea and ammonium nitrate. **Phosphorus fertilizers** are manufactured by mining phosphate rock, which is treated with sulfuric acid to produce phosphoric acid; this acid is then used to make phosphate-based fertilizers like monoammonium phosphate (MAP) and diammonium phosphate (DAP). **Potassium fertilizers** are generally obtained by mining potash ores, followed by refining processes to extract potassium chloride or potassium sulfate. Advanced production methods also include the creation of **controlled-release fertilizers**, where nutrients are encapsulated in polymer coatings to ensure a slow and consistent release into the soil, minimizing nutrient loss and improving plant uptake efficiency.

Acholi	English
Lagwece	ammonia nitrate
tic ne dwong	phosphoric acid
kado	potash ores
kado ki yamo pii	potassium chloride

Environmental Impact of Fertilizers
The environmental impact of fertilizers, particularly synthetic ones, is significant and multifaceted. When used in excess, fertilizers can lead to **nutrient runoff**, where excess nitrogen and phosphorus are washed into water bodies, causing **eutrophication**. This process leads to the overgrowth of algae, which depletes oxygen in the water and creates dead zones, harming aquatic life. Additionally, nitrogen-based fertilizers can release greenhouse gases like nitrous oxide (N_2O), contributing to climate change. Overuse of fertilizers can also alter soil chemistry, reducing its natural fertility and affecting soil microbial populations. Furthermore, the production of synthetic fertilizers consumes large amounts of energy, often derived from fossil fuels, adding to their carbon footprint. To mitigate these environmental issues, sustainable practices such as precision agriculture, organic fertilization, and controlled-release formulations are being increasingly adopted.

Acholi	English
lonyo nam	eutrophication
lwoko yamo pit	nutrient runoff
yamo pit ki wang	nitrous oxide
kwonyo kado ki kom ngom	affecting soil

Fertilizer Chemistry in Soil
Fertilizer chemistry in soil involves complex interactions that influence nutrient availability and plant uptake. When fertilizers are applied, nutrients like nitrogen, phosphorus, and potassium undergo various chemical reactions depending on soil properties, such as pH, moisture, and microbial activity. **Nitrogen** in the form of ammonium (NH_4^+) can be absorbed by plants or converted to nitrate (NO_3^-) through nitrification, making it more mobile but also prone to leaching. **Phosphorus**, often applied as phosphate (PO_4^{3-}), tends to bind with soil particles, especially in acidic or alkaline soils, limiting its availability to plants. **Potassium** ions (K^+) are typically more stable in soil but can be fixed in clay minerals, reducing their immediate availability. Soil microorganisms play a critical role in decomposing organic fertilizers, releasing nutrients slowly and improving soil structure. Overall, the effectiveness of fertilizers depends on soil conditions, as factors like pH, organic matter, and moisture affect nutrient solubility, retention, and uptake by plant roots.

Acholi	English
Lagwece	ammonium
pit	nitrate
dano	phosphate
kado	Potassium ions

Pollution

Air Pollution
In chemistry, air pollution involves the study of the chemical composition and reactions of pollutants in the atmosphere. Key pollutants include gases like sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM). These pollutants often undergo various chemical reactions in the atmosphere; for example, NOx and VOCs can react under sunlight to form ground-level ozone (O_3) in a process known as photochemical smog. Sulfur dioxide can react with water vapor to form sulfuric acid, contributing to acid rain. Understanding the chemical properties, reactions, and interactions of these pollutants is crucial for developing methods to monitor, control, and mitigate air pollution's environmental and health impacts.

Acholi	**English**
yamo pii ma wang	sulfur dioxide (SO_2)
yamo pit ma wang	nitrogen oxides (NOx)
yamo yweyo	carbon monoxide (CO)

Water Pollution
In chemistry, water pollution involves the study of the introduction of harmful chemicals and substances into water bodies, affecting their chemical composition and quality. Key pollutants include heavy metals like lead, mercury, and arsenic, organic compounds such as pesticides, pharmaceuticals, and petroleum products, as well as nutrients like nitrates and phosphates from agricultural runoff. These chemicals can undergo various reactions in water, altering their toxicity and impact on aquatic life and ecosystems. For example, excessive nitrates can lead to eutrophication, a process where water bodies become oxygen-depleted due to the overgrowth of algae. Understanding the chemical interactions and reactions of these pollutants is vital for developing effective water treatment and remediation strategies to preserve water quality.

Acholi	English
laol pii	lead
pii menyo	mercury
aburu	arsenic

Soil Pollution

Soil pollution in chemistry involves the contamination of soil with harmful chemicals, affecting its composition and fertility. Key pollutants include heavy metals like lead, cadmium, and arsenic, which can bind to soil particles and persist for long periods, as well as organic contaminants such as pesticides, herbicides, and industrial solvents. These chemicals can alter the soil's pH, disrupt microbial activity, and reduce nutrient availability for plants. Some pollutants, like persistent organic pollutants (POPs), can undergo chemical reactions in the soil, forming toxic byproducts. Understanding the chemical behavior and interactions of these pollutants in the soil is crucial for developing strategies to remediate contaminated land and protect ecosystems.

Acholi	English
lagwoki otanga	pesticides
lagwoki doo	herbicides
latitii tar	cadmium
la ngo	solvents

Plastic Pollution

Plastic pollution in chemistry focuses on the accumulation and breakdown of synthetic polymers in the environment. Plastics, composed primarily of long chains of hydrocarbons, resist natural decomposition due to their stable chemical structures. Over time, larger plastic debris breaks down into microplastics through physical, chemical, and photodegradation processes, releasing toxic additives like bisphenol A (BPA) and phthalates into soil and water. These microplastics can adsorb other environmental pollutants, such as heavy metals and persistent organic pollutants (POPs), creating complex chemical mixtures that can enter the food chain. Understanding the chemical composition, degradation processes, and environmental interactions of plastics is crucial for developing methods to reduce, manage, and remediate plastic pollution.

Acholi	English
cuma ma pec	heavy metals
tob pa jami	degradation processes
yibe pa piny	environmental interactions
dwoko	reduce

Chemical Waste Management

Chemical waste management in chemistry involves the proper handling, treatment, and disposal of hazardous chemical substances to minimize their environmental and health impacts. Chemical wastes can include solvents, acids, bases, heavy metals, and byproducts from industrial, laboratory, or agricultural activities. Proper management includes chemical neutralization, precipitation, incineration, and containment processes, which are used to reduce toxicity and volume. For example, neutralizing acidic waste with a base before disposal can prevent soil and water pollution. Recycling and reclaiming valuable chemicals, as well as using less hazardous alternatives, are also part of sustainable chemical waste management practices. Effective chemical waste management requires understanding the chemical properties, reactions, and potential hazards of different

substances to ensure safe treatment and disposal methods.

Acholi	English
okwenye	bases
ominyo	acids
ngoyo	solvents

Chemical

Periodic Table of Elements
The Periodic Table of Elements is a systematic arrangement of all known chemical elements based on their atomic number, electron configurations, and recurring chemical properties. Elements are organized into rows called periods and columns known as groups or families. Each element’s position reflects its atomic structure and behavior, with elements in the same group often exhibiting similar characteristics, such as reactivity or bonding tendencies. The table provides crucial information about each element, including its symbol, atomic number, atomic mass, and sometimes its state of matter. This organization aids in predicting the properties of elements, understanding chemical reactions, and exploring new compounds in chemistry.

English	Acholi	atomic number	atomic mass	Acholi symbol	English symbol
hydrogen	liel	1	1.008	L	H
carbon	got	6	12.006	G	C
nitrogen	pit	7	14.007	P	N
oxygen	wang	8	15.999	W	O

Chemical Bonding
Chemical bonding is the process by which atoms combine to form compounds, resulting in the stability of atoms through the attainment of a lower energy state. The primary types of chemical bonds are ionic, covalent, and metallic. In ionic bonding, atoms transfer electrons, resulting in the formation of positively and negatively charged ions that attract each other. Covalent bonding involves the sharing of electrons between atoms, often seen in molecules like water (H_2O) and oxygen (O_2). Metallic bonding, on the other hand, occurs in metals, where electrons are free to move within a "sea of electrons," allowing metals to conduct electricity and heat. These bonds determine the properties of substances, such as melting and boiling points, electrical conductivity, solubility, and hardness. Understanding chemical bonding is essential for predicting how different substances interact and behave in various conditions.

Acholi	English	formula
pii	water	H2O
lagwence	ammonia	NH_3
moo	Methane	CH_4
yweyo	carbon dioxide	CO_2

acids and bases
Acids and bases are two fundamental categories of chemical substances that have distinct properties and behaviors. Acids are compounds that release hydrogen ions (H^+) when dissolved in water, giving them a sour taste and the ability to turn blue litmus paper red. Common examples include

hydrochloric acid (HCl) and sulfuric acid (H_2SO_4). Bases, on the other hand, release hydroxide ions (OH^-) in water and often have a bitter taste and slippery feel, turning red litmus paper blue; examples include sodium hydroxide (NaOH) and ammonia (NH_3). The strength of an acid or base is measured using the pH scale, which ranges from 0 to 14, with acids having a pH less than 7, bases greater than 7, and neutral substances, like pure water, at pH 7. Understanding acids and bases is crucial in fields like chemistry, biology, medicine, and environmental science, as they play key roles in chemical reactions, biological processes, and industrial applications.

Acholi	English
Pecuma omiyo	sulfuric acid
liolo	hydroxide
pecuma piiliel	sodium hydroxide
languece	ammonia

Organic Chemistry
Organic chemistry is the branch of chemistry that focuses on the study of carbon-containing compounds, particularly those with carbon-hydrogen (C-H) bonds. It encompasses a vast array of substances, including simple molecules like methane (CH_4) to complex macromolecules like proteins, DNA, and synthetic polymers. Organic compounds are classified based on functional groups, such as alcohols, aldehydes, ketones, carboxylic acids, and amines, which largely determine their chemical behavior and reactivity. The versatility of carbon atoms to form chains, rings, and complex structures with various elements allows for the diversity of organic molecules. Organic chemistry is fundamental to understanding biological processes, the development of pharmaceuticals, the creation of materials like plastics, and numerous industrial applications.

Acholi	English
akwanya	aldehydes
yweya	ketones
akidi	carboxylic acids
langueco	amines

Chemical Reactions and Equations
Chemical reactions are processes in which substances, known as reactants, are transformed into new substances called products. During a reaction, the atoms in the reactants rearrange to form new bonds, resulting in changes in chemical composition and energy. Chemical reactions are often represented using chemical equations, which provide a symbolic way to express what happens during the reaction. In a chemical equation, reactants are listed on the left, products on the right, and an arrow indicates the direction of the reaction. For example, in the combustion of methane: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$. Equations must be balanced to follow the law of conservation of mass, ensuring that the number of atoms for each element is the same on both sides. This balancing is essential for accurately predicting the quantities of substances involved in reactions and understanding the underlying principles of chemical interactions.

methane: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
moo: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

Rocks

Formation Processes
Rock Formation Processes involve various chemical and physical changes that lead to the creation of

the three main rock types: igneous, sedimentary, and metamorphic. Igneous rocks form through the cooling and solidification of molten magma or lava, resulting in minerals crystallizing based on their melting points. Sedimentary rocks are created through the deposition, compaction, and cementation of mineral and organic particles, often involving chemical processes like precipitation of minerals from water. Metamorphic rocks originate when existing rocks undergo chemical and physical transformations due to high pressure, temperature, or chemical reactions with fluids, leading to the formation of new minerals and textures. Each process is influenced by the environment and chemical composition, creating diverse rock types with distinct properties.

Acholi	English
mach ngom	igneous
ojoke	sedimentary
lieto	metamorphic

Rock Cycle

The Rock Cycle is a continuous process describing the transformation of rocks through various geological and chemical processes over time. It begins with igneous rocks, formed from the cooling and solidification of magma or lava. These rocks can break down into smaller particles through weathering and erosion, which are then transported and deposited to form sedimentary rocks through compaction and cementation. When sedimentary or igneous rocks are subjected to intense heat and pressure within the Earth's crust, they transform into metamorphic rocks. If these rocks melt due to extreme conditions, they become magma, and the cycle restarts. This dynamic cycle involves complex chemical reactions, mineral changes, and energy flow, showcasing the interconnected nature of Earth's geology.

Acholi	English
rube wilibo	chemical reactions
loce kene	mineral changes
mwol mac	energy flow

Igneous Rocks

Igneous Rocks form from the cooling and solidification of molten rock material known as magma (below the Earth's surface) or lava (on the Earth's surface). They are primarily composed of silicate minerals like quartz, feldspar, mica, and olivine, with their mineral composition depending on the chemical makeup of the original magma. Igneous rocks are categorized into two main types: intrusive (plutonic), such as granite, which crystallize slowly beneath the Earth's surface, resulting in large, visible crystals; and extrusive (volcanic), like basalt, which cool rapidly on the surface, leading to fine-grained or glassy textures. The chemical characteristics, such as silica content, further classify igneous rocks into felsic, intermediate, mafic, and ultramafic groups, each with distinct mineralogies and physical properties. These rocks are fundamental to understanding the Earth's crust formation, tectonic activity, and the cycling of elements within the planet.

Acholi	English
komwang	quartz

oduong	feldspar
weng	mica
latiti	olivine

Sedimentary Rock
Sedimentary Rocks form from the accumulation, compaction, and cementation of mineral and organic particles, as well as the precipitation of minerals from water. These rocks are typically layered, or stratified, reflecting their gradual deposition over time in environments such as riverbeds, oceans, deserts, and lakes. There are three main types: clastic, formed from fragments of other rocks (like sandstone and shale); chemical, formed from the precipitation of minerals from solution (like limestone and rock salt); and organic, composed of accumulated biological material (such as coal and chalk). The chemical composition of sedimentary rocks varies depending on their origin, with some rich in silica, carbonates, or iron oxides. They often contain fossils, providing valuable information about Earth's history, past climates, and the evolution of life.

Acholi	**English**
Aturcon	clastic
lietoribe	sandstone
yweyo	carbonates
kwoyowang	silica

Metamorphic Rock
Metamorphic Rocks are formed when existing rocks, either igneous, sedimentary, or other metamorphic rocks, undergo transformation due to intense heat, pressure, or chemically reactive fluids within the Earth's crust. This process, called metamorphism, alters the mineral composition and structure of the rock without melting it, resulting in new textures and mineral assemblages. Metamorphic rocks are classified into two main types: foliated, like schist and gneiss, which exhibit a layered or banded appearance due to the alignment of minerals under directional pressure; and non-foliated, such as marble and quartzite, which do not have a distinct layered structure. The original rock's composition, temperature, pressure conditions, and the presence of fluids all influence the characteristics of the resulting metamorphic rock. These rocks provide insights into the conditions and processes deep within the Earth, helping geologists understand tectonic movements and the formation of mountain ranges.

Acholi	**English**
lietoliet	marble
lietoribeliet	quartzite
lietorube	schist
lietolieto	gneiss

Cold

Wind
Wind is the movement of air caused by differences in atmospheric pressure, typically flowing from areas of high pressure to low pressure. This movement plays a crucial role in Earth's weather

patterns, climate, and the distribution of heat and moisture around the globe. Winds can vary in scale, from gentle breezes to powerful gusts and storms, influenced by factors such as the rotation of the Earth, the presence of landforms, and temperature variations. They also have significant impacts on both natural and human activities, affecting everything from ocean currents to agriculture, and are harnessed as a renewable energy source through wind turbines.

Acholi	English
yamo malo piny	Gas diffusion
twir yamo	Wind speed
kero yamo	Wind force
malo	evaporation

Ice

Ice is the solid form of water that occurs when its temperature drops below the freezing point of 0°C (32°F) under normal atmospheric pressure. Its crystalline structure, formed through hydrogen bonding between water molecules, makes ice less dense than liquid water, which is why it floats. This unique property plays a crucial role in the natural world, influencing climate and ecosystems, particularly in polar regions where large ice masses like glaciers and icebergs are found. Ice is not only a key component in weather patterns but also serves important functions in various human activities, including preservation, sports, and as a sculptural medium. Its reflective surface also helps regulate the Earth's temperature by reflecting sunlight back into space.

Acholi	English
kido ma pek	solid form
kido ma mopoto	Freezing point
mo umo	Insulation properties
ma mwol …	Melting point of ice

Rain

Rain is a natural process that occurs when water vapor in the atmosphere cools and condenses into droplets, forming clouds. When these droplets combine and grow large enough, they fall to the ground due to gravity as precipitation. This cycle is a vital part of the Earth's water cycle, replenishing freshwater supplies in rivers, lakes, and aquifers, and sustaining plant and animal life. Rainfall patterns vary greatly across different regions, influenced by factors such as geography, temperature, and prevailing winds. Beyond its ecological importance, rain affects various human activities, including agriculture, transportation, and daily life, while also shaping landscapes through erosion and nutrient distribution.

Acholi	English
yamo pii	Evaporation of water
yoo mi poto	Condensation process
pong pwol	Formation of clouds
pii poto piny	Precipitation of water

Shade

Shade is the relative darkness and coolness created when an object blocks direct sunlight, providing a respite from heat and glare. It plays an essential role in both natural ecosystems and human

environments, offering protection for plants, animals, and people from the sun's harsh rays. In nature, shade influences plant growth by affecting light exposure and temperature, often resulting in distinct microclimates that support diverse species. In urban areas, shade provided by trees, buildings, and structures like umbrellas or awnings can significantly lower temperatures, contributing to energy savings and enhanced comfort. This cooling effect makes shaded spaces invaluable in mitigating the urban heat island effect and promoting outdoor activity and relaxation.

Acholi	English
gwoko tara pa chieng	Protection from sunlight
dwoko lwoto	Reduces heat absorption
doko mwol yamo	Slows down evaporation rate
loco aloce i apita	Alters photosynthesis in plants

Snow

Snow is a form of precipitation that occurs when water vapor in the atmosphere freezes into ice crystals, forming intricate, hexagonal flakes. This process takes place in clouds where temperatures are low enough for water vapor to directly transition into solid ice without becoming liquid first. When these ice crystals cluster together and become heavy, they fall to the ground as snow. Snow significantly impacts the environment and human activities, contributing to the Earth's albedo effect by reflecting sunlight, which helps regulate the planet's temperature. In ecosystems, snow provides insulation for plants and animals during the winter months, while in human society, it influences activities ranging from agriculture to transportation and recreation, such as skiing and snowboarding. Its seasonal beauty also carries cultural and aesthetic significance, marking the arrival of winter in many parts of the world.

Acholi	English
pii poto i kiny piny	Water that freezes in the atmosphere
piny ma leng ki luru	Crystal structure of snowflakes
kwanyo gin ma kwok ki yamo	Absorbs pollutants from the air
kwoko piny ki ngico piny	Insulates the ground from cold temperatures

fire

Types of fire

There are several types of fire, categorized based on the material burning and the appropriate method of extinguishing. **Class A fires** involve ordinary combustibles like wood, paper, or cloth, and are extinguished with water or foam. **Class B fires** involve flammable liquids such as gasoline, oil, or alcohol, and are best extinguished with foam, dry chemicals, or CO_2. **Class C fires** are electrical fires and require non-conductive extinguishing agents like CO_2 or dry chemicals to prevent electrocution. **Class D fires** involve combustible metals like magnesium or sodium, and specialized dry powders are used to extinguish them. Lastly, **Class K fires** occur in cooking oils and fats, typically in kitchens, and require wet chemical extinguishers to prevent the fire from reigniting. Understanding these types is crucial for applying the correct fire-fighting technique.

Acholi	English
lodi	amber

mach	electricity
mach	fire
lolwele	firefly

What gives fire
Fire is a chemical reaction known as combustion, where heat, fuel, and oxygen interact in the right proportions to produce flame, light, and heat. This process is driven by the **fire triangle**, which consists of three essential elements: **fuel**, **oxygen**, and **heat**. Without any one of these, fire cannot start or sustain itself.

Acholi	English
lodwele	light fly
rech	fish
moo	fuel
nyim	simsim

What brings fire
Fire is brought about by the combination of three key elements: **fuel**, **oxygen**, and **heat**, forming what is known as the **fire triangle**. When a fuel source, such as wood, gasoline, or paper, is exposed to enough heat to reach its ignition temperature and is in the presence of oxygen (usually from the air), a chemical reaction called combustion occurs. This reaction releases energy in the form of heat and light, sustaining the fire. If any one of these elements—fuel, heat, or oxygen—is removed or insufficient, the fire cannot start or will be extinguished.

Acholi	English
moo yaa	shea butter
nyim	simsim
arege	alcohol
pii	water

Tree

Resources
Wood products are versatile and widely used across various industries, offering both practical and aesthetic benefits. These products range from construction materials like lumber, plywood, and beams, which are essential for building homes and structures, to furniture, flooring, and cabinetry that provide functionality and style in interior design. Additionally, wood is processed into paper, cardboard, and packaging materials through pulping. Wood by-products, such as wood chips and sawdust, are used for particleboard, mulch, and biofuels like wood pellets. Furthermore, wood is also used in crafting tools, musical instruments, and decorative items, making it a valuable resource in both industrial and artisanal applications.

Acholi	English
bongo	cloth
mac	fire
kwoko	pellets
moo	oil

Oil

Oil from trees, often referred to as tree oils or essential oils, are naturally occurring oils extracted from various parts of a tree, such as the leaves, bark, fruits, or seeds. These oils are valued for their wide range of uses in industries like cosmetics, medicine, and food production. For example, **tea tree oil** is extracted from the leaves of the tea tree and is known for its antimicrobial properties, making it popular in skincare products. **Olive oil**, extracted from the fruit of olive trees, is widely used for cooking and in health products due to its beneficial fats. **Neem oil**, derived from the seeds of the neem tree, is used in agriculture as a natural pesticide and in personal care products for its healing properties. These oils, often obtained through processes like cold-pressing or steam distillation, harness the tree's natural compounds, providing both functional and aromatic benefits.

Acholi	English
moo yaa	shear nut
lango	tree
aceng	sun flower
nima	neem
pobi	Olive

Drink

Drinks made from trees are derived from various parts of trees, including their fruits, sap, leaves, and bark, and have been used for both nutrition and medicinal purposes for centuries. One of the most well-known is **maple syrup**, which is made by boiling the sap of maple trees and is often used as a sweetener in beverages and foods. Another example is **coconut water**, the clear liquid found inside coconuts, which is a refreshing drink rich in electrolytes. **Birch sap**, harvested from birch trees, is consumed as a traditional drink in many cultures and is believed to have detoxifying properties. Additionally, **tea** made from tree leaves, such as tea tree leaves or the leaves of other species like moringa, provides a variety of health benefits. These tree-based beverages are valued for their natural flavors and often contain important vitamins, minerals, and antioxidants.

Acholi	English
lokwok	tree
oyolo	tree
manga	mango
abalo	apple
Kuomu	Tree