**Урок 9 Chemical Engineering**

although - хотя

approximate - приближенный

batch – пакет/партия

beverage - напиток

capacity - вместимость

consider factors – рассматривать факторы

constraints - ограничения

continuous - непрерывный

costs - расходы

efficient - эффективный

eliminate – устранить/ликвидировать

fluid - жидкость

haphazard – случайный/бессистемный

initial - начальный

manufacture - производство

natural gas – природный газ

nowadays – в настоящее время

oil refinery – нефтеперерабатывающий завод

on a large scale – в больших масштабах

otherwise - иначе

petrochemical - нефтехимический

pollute - загрязнять

process - процесс

profit – выгода/доход

raw material - сырье

remove - удалить

sensitive - чувствительный

simultaneous – одновременный

typically – типично

unprofitable - невыгодный

utilize - утилизировать

via something – посредством чего-то

**Урок 10 From Chemical Science to Forensics**

applied - прикладной

apply something to something – применить что-то к чему-то

attach - прикреплять

bind - связать

coat – оболочка/слой

coil - наматывать

derivative - производное

dissolve - растворить

emphasize - акцентировать

enforcement - правоприменение

forensic chemistry – судебно-медицинская химия

reveal - раскрыть

sequence - последовательность

slightly – слегка/немного

solvent - растворитель

vaporize – испарять/выпаривать

**Урок 11 Green: the New Colour of Chemistry**

accompany – сопровождать

adverse - неблагоприятный

community - сообщество

degrade - ухудшать

device - устройство

efforts – усилие/стремление

enormous amounts – огромные объемы

giant - гигантский

habitat – среда обитания

maintain - поддерживать

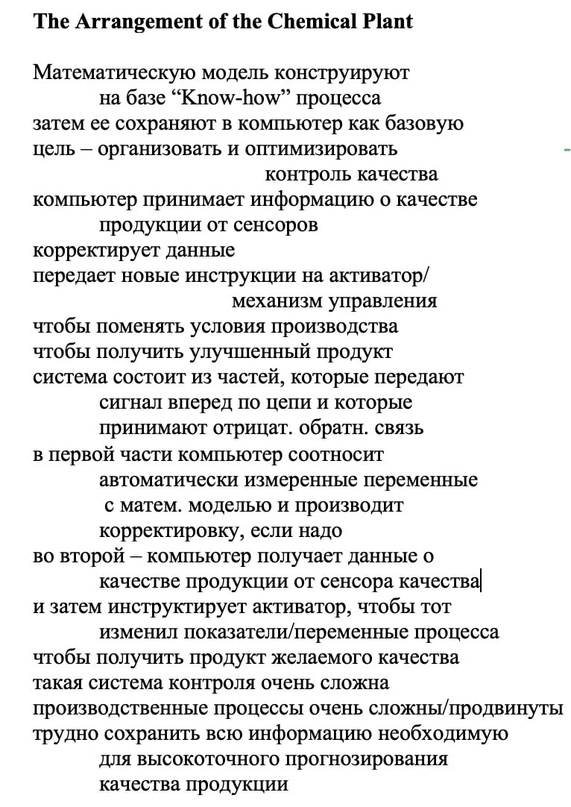
numerous - многочисленные

on a huge scale – в огромных масштабах

soil - почва

to refer to as – обозначать как

wastes - отходы

The Arrangement of the Chemical Plant 123

A mathematical model is constructed based of the know-how process

Then it is saved in the computer as a basic

The purpose of the mathematical model is to organize and optimize quality control.

The computer accepts information from the sensors about the quality of the product

Then it corrects the data

After that, the computer gives instructions to the actuators

This changes the production conditions

And we get an improved product

The system consists of parts

The first part gives the signal forward

The second part accepts negative feedback

In the first part, the computer refers automatically measured input variables with a mathematical model

Then the computer makes correction if necessary

In the second part, the computer accepts data about the quality of the products from the quality sensor

Then the computer instructs the activator

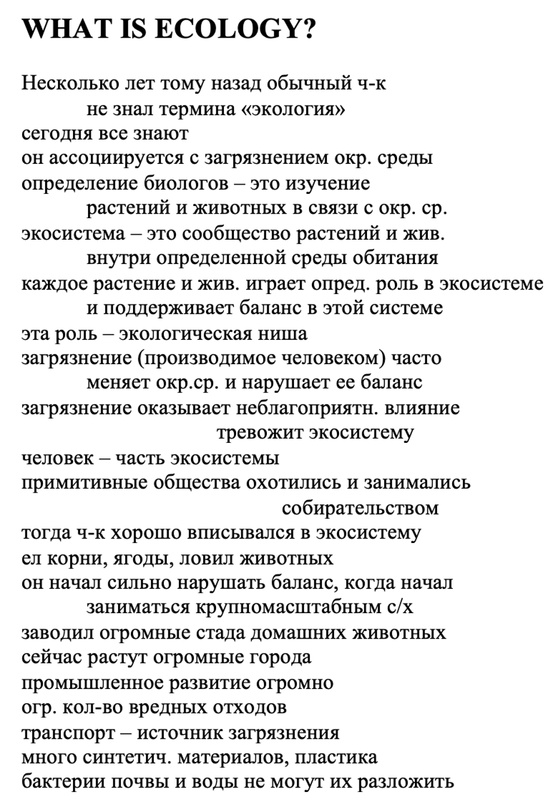
After that, the activator changes the process variables

And we get a product of the desired quality

Such a control system and production processes are very complex.

Because of this, it is difficult to save all information

The information is necessary for high-precision forecasting of product quality



What is Ecology?

A few years ago, the average person did not know the term ecology.

Today, everyone knows this term.

For an ordinary person, the term ecology is associated with environmental pollution.

For a biologist, this term is the study of plants and animals in relation to their environment

An ecosystem is a community of plants and animals within a particular habitat

Every plant or animal in the ecosystem plays a role.

They maintain a balance in this system.

This role is called an ecological niche.

People produce pollution.

This often changes the environment and disturbing it is balance

Homo sapiens is a part of an ecosystem

Primitive societies hunted and gathered

Then the person fit well into the ecosystem

He ate roots and berries and caught animals

He began to seriously disturb the balance when he started farming on a large scale

He keeps large herds of animals

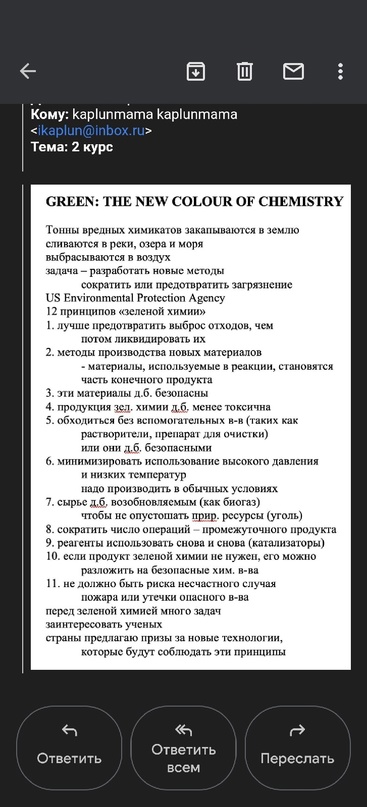
Large cities are growing now

Industrial development is huge

This leads to introduce huge amount of harmful wastes

For example, transportation devices are sources of pollution

There are many synthetic materials and plastics that cannot decompose soil and water bacteria

Green Chemistry

Tons of harmful chemicals are buried underground, dumped into rivers, lakes and seas, or thrown into the air.

The goal of green chemistry is to develop new methods that will reduce and prevent pollution

U.S. Environmental Protection Agency present the Twelve Principles of green chemistry

1. It is better to prevent the release of waste than to eliminate them later

2. Use other methods of producing new materials.

All materials used in the reaction must become part of the final product

3. Materials must be safe

4. Green chemistry products should be less toxic

5. It is necessary to do without "auxiliary substances" such as solvents, cleaning agents;

Or they should be safe.

6. In green reactions, it is necessary to minimize the use of high pressure and low temperatures.

It is necessary to produce in normal conditions

7. Raw materials must be renewable (for example, as biogas)

So as not to deplete a natural resource (like coal).

8. The "green" process should reduce the number of stages and the number of intermediate products

9. If the product of green chemistry is not needed, it can be decomposed into safe chemicals.

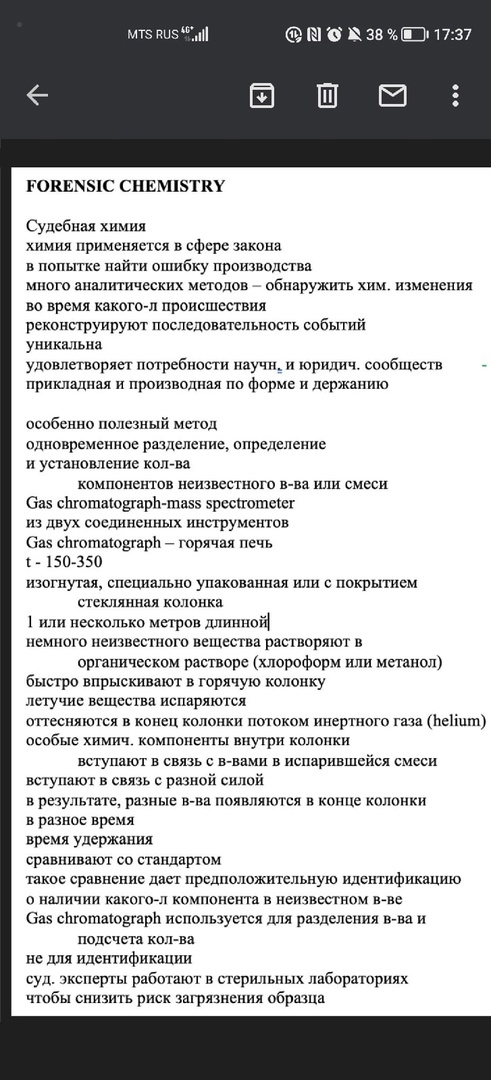
10. Сatalytic reagents should be used again and again

11. There should be no risk of an accident, fire or leakage of a dangerous substance

Green chemistry faces many challenges.

Countries are interested in scientists

they offer prizes for new technologies which follow these rules

Forensic Chemistry

Forensic chemistry is the application of chemistry to law enforcement.

It is used to find production mistakes.

There are many analytical methods.

They help to detect chemical changes during an incident.

Forensic chemistry helps to reconstruct the sequence of events.

Forensic chemistry is unique.

It meets the needs of the scientific and legal communities.

The gas chromatography-mass spectrometry method is particularly useful

This method simultaneously separates, identifies and quantifies the components of an unknown substance or mixture.

Gas chromatography-mass spectrometry consists of two connected instruments.

The gas chromatograph is a hot oven with a temperature of 150-350 degrees Celsius.

It contains a bent or coiled, specially packed or coated glass column with a long one or a few meters.

A little unknown substance is dissolved in an organic solution of chloroform and methanol.

Then they are quickly introduced into the column.

These volatile substances evaporate.

The inert gas flow for example helium moves the substances to the end of the column

There are special chemicals inside the column.

They react with substances in the vaporized mixture

They come into contact with different forces

As a result, different substances appear at the end of the column in different time

This is called retention time

Then the retention time is compared with the standard.

This gives a presumptive identification of the presence of any component in an unknown substance

Gas chromatograph is used for separation and quantification, not for identification.

Forensic chemists work in a sterile laboratory.

This minimizes the risk of pollution of the sample.

Personal Finance

There’s a basic formula to win at personal finance: spend less money than you make.

One of the reasons that we’re bad with money is because money is taboo.

One of the best ways to learn about personal finance is through books.

3 personal finance books:

The total money makeover by Dave Ramsey

I will teach you to be rich by Ramit Sethi

Unshakeable by Tony Robbins

We need to avoid lifestyle creep. We to be not inflate spending as our income rises. 5,10 years down the road we’re gonna be able to live a lot more comfortably and we’re gonna have so much more security than if we continue to increase our lifestyle every year.

We don't have to buy extra things. Advertising driven to make us feel as if we deserve the indulgence. We face pressure from advertising, social media and ourselves. But you need to understand that you deserve not living paycheck to paycheck.

You need to make some sacrifices to get to a point where you can start to take risks. Put your push yourself outside of your comfort zone. First of all, you need to understand that financial freedom. financial freedom when we truly understand why we don’t want to be living paycheck to paycheck.

We face a lot of pressure. But if you can out maneuver these forces, if you can build a healthy relationship with money and create positive habits that stick. You will be able to become financially free.