The Wonders of Geopolymer

EAE Learning objectives for this lesson

Learn how to use the correct adjective word order. Learn vocabulary about concrete. Comprehension and expression

Activity One - Questions about the use of concrete in our cities - opinions.

1. What is concrete?
2. Do you know how it is made?
3. Where is it used the most?
4. Do you know some buildings built entirely out of concrete?
5. Do you like them?
6. Is Concrete environmentally responsible?



Activity Two - Read the article and do the corresponding exercises afterwards.

The History of Geopolymer

The first to use the term geopolymer was a French chemist Joseph Davidovits in 1978. The term geobeton was suggested by Russian engineers of Renca Rus as a particular case for construction materials based on geopolymer **binders**.

The use of **geobeton** in construction is **widely spread** in Australia, Ireland, USA and others. For instance, in 2014 for the first time an **entire** airport in Brisbane was constructed with a concrete based on geopolymer binders. Moreover, metropolitan **tubings** and elements of the **load bearing** structures are produced. Back in the 80-s of the 20th century in USA they used special high strength geopolymer concretes for the airfield and road repair.

In Russia the development of similar materials started in 1950s. The research works were made by the Kiev Institution of Civil Engineering guided by Glukhovskiy V.D. Various objects were built including civil and industrial constructions (residential house in Lipetsk, a part of the **railroad** with concrete ties in Moscow region, a motorway in Magnitogorsk, surface of the **tank** training battlefield near Chelyabinsk and others).

Technology of geopolymer concrete is based on the idea of applying **inorganic** mineral substances the production of which does not require the additional use of natural resources and does not lead to CO2 emissions into the atmosphere (byproducts of metallurgical, electrometallurgical industries and power plants).

Geobeton is chemically inert to a range of aggressive substances, it is **sturdy** both to high temperatures and severe climates. Thanks to excellent physical-chemical properties geobeton can be widely used in construction. In comparison with traditional concrete production technology based on portland cement, geobeton has better results in strength, durability, freeze-thaw resistance, fire resistance, heat insulation, corrosion and aggressive substance resistance including some types of acids.

As a result, the use of geobeton improves general ecological situation by reducing CO2 emissions by up to 90% and recycling industrial byproducts. Their properties enable their implementation in the spheres with specific requirements towards concrete.
http://geocement.ru/

1. What is geobeton?
2. Which countries use geobeton a lot?
3. How old is geobeton or similar materials?
4. What are the advantages of geobeton concrete?
5. What does the word sturdy mean?

Activity three - Based on the article match the verbs on the left with their definitions on the right.

• Binders	To go over a big area, used in many places
• Widely spread	Strong and resistant
• Entire	All of something
• tubings	To adhere, to glue, to attach
• Load bearing	A system or network for trains
• Railroad	Not consisting of or deriving from living matter
• Tank	A vehicle used in war that is enormous
• Sturdy	A system like a tunnel used to transport water, people, waste but usually underground
• inorganic	To carry a heavy weight

Activity Four - Using descriptive adjectives in English
Adjective Word order. This is the order of adjectives in English sentences:
So for example if we are talking about a building made of concrete we would say:
“The large, old, rough grey concrete walls shadowed the park.”
We cannot say:
The concrete old grey rough walls - that would be INCORRECT because the adjective word order does not follow the rules. See the order on the next page.

1 Determiners – a, an, the, my, your, several
2 Observations – lovely, boring, stimulating
3 Size – tiny, small, huge, etc.
4 Shape – round, square, rectangular, etc.
5 Age – old, new, ancient, etc.
6 Color – red, blue, green, etc.
7 Origin – British, American, Mexican, etc.
8 Material – gold, copper, silk, etc.
9 Qualifier – limiters for compound nouns.
10 NOUN (is last)



In the text below, identify the adjectives; what type of adjective is it? Us the list from above.

- Geobeton is chemically inert to a range of aggressive substances, it is sturdy both to high temperatures and severe climates.

- In comparison with traditional concrete production technology based on portland cement, geobeton has better results in strength, durability, freeze-thaw resistance, fire resistance, heat insulation, corrosion and aggressive substance resistance including some types of acids.

Activity Five - Descriptions of concrete. Using the word order list make some sentences about the images you see.







Activity Six - Present perfect tense explained

The Present Perfect tense is used to explain an action that happened in the past but which is linked to the present. Its puts emphasis on how the past affects the present or future. It often includes à time description (yesterday, last week, two years ago).

Differentiating between the past simple and the present perfect

What did you do last week?
I saw the new movie (present simple)
The action is finished

Do you want to go see the new movie?
No, I have seen the new movie. I would prefer to see another film. (present perfect)
The action is finished and explains à decision in the present

Activity Seven - Describing a problem - explain - HAS GONE WRONG, HAS HAPPENED.

With your teacher, pretend you are a customer who is unhappy with concrete construction installed at your home. Call the construction office and explain what **has gone** wrong, what **has happened** (use the present perfect).
Use the images to help you think of problems.







Activity Eight - watch the video and answer the questions

How we can recycle CO2 to make eco-friendly concrete

https://youtu.be/rZo9GtlHCL8

1. What is the problem with non-eco concrete?

2. How much greenhouse gases are produced by non-eco concrete?

3. What could change if eco-concrete is used for construction?

4. How is eco-concrete manufactured?

Activity Nine - Role Plays

1. - Sell eco concrete to a well recognized construction company by convincing them why traditional concrete is not as good.

2. - Explain what Geopolymer is to a stranger who doesn't know anything about construction.
3. Use the vocabulary from the lesson.

4. - Using Present Perfect, explain to your boss the new innovations in concrete.

