

Lesson 6: Lexical Inferencing

Inferencing is a great tool to use when encountering unfamiliar vocabulary. It involves guessing intelligently the meaning of new words by using the context.

When encountering unfamiliar words, clues from the text known as context clues can be used. These clues are words that come before or after the new word and help to get an idea of what the new word means. Context clues can be definitions, descriptions, examples, explanations, synonyms, and antonyms.

Pre-Tasks

Ultra-thin layers of rust generate electricity from flowing water

Circle the letter that corresponds to the best option to complete each exercise in sections 1 – 5

1. Predicting (5)

According to the cues provided, what is the text about?

- a. Rust is a common problem on infrastructure
- b. Iron oxide can convert kinetic energy of saltwater into electricity
- c. The electrokinetic effect will replace solar power
- d. A new discovery to be used in specific scenarios



July 30, 2019

5 There are many ways to generate electricity-batteries, for example solar panels, wind turbines, and hydroelectric dams; and now there is rust. A new research conducted by scientists at Caltech and Northwestern University (US) shows that thin films of rust - iron oxide - can generate electricity when saltwater flows over them. These films represent an entirely new way of generating electricity and could be used to develop new forms of sustainable power production.

10 Interactions between metal compounds and saltwater often generate electricity, but this is usually the result of a chemical reaction in which one or more compounds are converted to new compounds. Reactions like these are what is at work inside batteries. In contrast, the new phenomenon discovered by Tom Miller, Caltech professor of chemistry, and Franz Geiger, Dow Professor of Chemistry at Northwestern, does not involve chemical reactions, but rather converts the kinetic energy of flowing saltwater into electricity.

15 The phenomenon, the electrokinetic effect, has been observed before in thin films of graphene and it is remarkably efficient. The effect is around 30 percent efficient at converting kinetic energy into electricity. For reference, the best solar panels are only about 20 percent efficient. "It is basically just rust on iron, so it is pretty easy to make in large areas," says Miller.

20 Though rust will form on iron alloys on its own, the team needed to ensure it formed in a consistently thin layer. To do that, they used a process called physical vapor deposition (PVD), which turns normally solid materials, in this case iron oxide, into a vapor that condenses on a desired surface. PVD allowed them to create an iron oxide layer 10 nanometers thick. When they took that rust-coated iron and flowed saltwater solutions of varying concentrations over it, they found that it generated several tens of millivolts and several microamps per cm².

25 The mechanism behind the electricity generation is complex, involving ion adsorption and desorption. The ions present in saltwater attract electrons in the iron beneath the layer of rust. As the saltwater flows, so do those ions, and through that attractive force, they drag the electrons in the iron along with them, generating an electrical current.

30 Miller says this effect could be useful in specific scenarios where there are moving saline solutions, like in the ocean or the human body. "For example, tidal energy, or things bobbing in the ocean, like buoys, could be used for passive electrical energy conversion," he says. "You have saltwater flowing in your veins in periodic pulses. That could be used to generate electricity for powering implants".

<https://www.sciencedaily.com>

2.Skimming (30)

Choose from the list **A-G** the main idea for paragraphs **1-6**. There is one extra letter that you do not need to use.

- A. The phenomenon studied is 30 % efficient at turning power into electricity.
- B. A new phenomenon has been discovered to convert electricity from rust.
- C. According to scientists the electrokinetic effect could be practical in precise contexts with saline solutions.
- D. Soon, this technology will be the most common way to generate electricity.
- E. The study turns kinetic energy of flowing saltwater into electricity.
- F. Electric current is not generated by chemical reaction but by an attraction force of ions and electrons.
- G. The process of physical vapor deposition enabled the creation of an iron oxide layer to be used with saltwater to generate power.

Paragraph 1	<input type="text"/>
Paragraph 2	<input type="text"/>
Paragraph 3	<input type="text"/>
Paragraph 4	<input type="text"/>
Paragraph 5	<input type="text"/>
Paragraph 6	<input type="text"/>