Reading 2

Skills:

- Details

- Simplify meaning of sentences

- Vocabulary in context

- Cause-effect

Getting started: Have you ever had an accident with a cellphone?

THE SCIENCE BEHIND EXPLODING CELL PHONES

Cell phones are now one of the basic needs of people. Almost all people now have their own cell phones. However, many people might not yet be aware about the risk of explosion among cell phones.

In 2016, as a matter of precaution, Samsung **recalled** its Galaxy Note 7 due to several cases of explosion. But exploding cell phones are not only Samsung's problem. There are many cases happening with other brands of cell phones, so there is something behind such explosion that only science can explain.

Why do cell phones explode?

Most cell phone explosions did not come from cell phones themselves. Most of the time, the batteries are the ones to blame. The common cause of battery explosion is when it is recharged too much. This is what happened with the Galaxy Note 7 and other brands of cell phones. On the other hand, battery defects are the primary reason. In a cell phone's battery system, there are separators that prevent two electrodes from connecting with each other. When the separators don't work properly, it is more likely that these two electrodes will touch one another, and this will cause explosion.

When two electrodes come into contact, the electrolytes directly receive all the energy that is supposed to stay in the battery. This is unusual as it is the electrodes on the side that should receive it. Electrolytes are unstable and very sensitive to heat. When there is too much heat, electrolytes react and cause other chemicals to produce gas, which elevates the existing level of heat. And every time such chemicals react more and more, gas is produced, which at the same time produces more heat. This condition leads to a thermal escape that causes fire.

Why do overcharging cause batteries to explode?

Most cell phones use lithium-ion batteries. These batteries are designed to prevent or tolerate **overcharging**. They are created like a bucket in which the bucket will never break when you keep on pouring liquid into it. What will happen is that liquid will only overflow but will not break the bucket. When batteries explode, the probable reason is factory defect. Some batteries do not explode even after overcharging it. However, there is a limit in everything. Princeton University materials scientist Dan Steingart says, “The battery is like a rubber band. When you're charging the battery, you're stretching the rubber band; when you're using it, you're releasing it. Just like a rubber band can break if you stretch it too much, putting too much energy into one side will ruin the battery.”

Overcharging and battery defects usually simply ruin the normal function of the battery. When the battery does not _____ properly, it simply sends the power to electrolytes, which are not supposed to receive it **as** electrolytes cause explosion when reacting with other chemicals.

How to prevent battery explosion?

Scientists are now studying and developing a certain type of electrolyte that does not easily cause explosion. This type of electrolyte is called ionic fluid. Ionic fluid is less susceptible to heat, and it is stable and safe. It requires much more heat to make it explode or to cause explosion. However, scientists are still working on the **downside** of using ionic fluid. The problem in using ionic fluid is that it can affect battery life. This is because heat delivers energy and power. Anything that reduces heat also reduces energy and life in the case of battery.

For now, scientists are still developing safer and better alternatives. Meanwhile, users must take into account safety precautions to prevent cell phone batteries from exploding. As much as possible, overcharging must be avoided. Furthermore, users should avoid using incompatible chargers. Most chargers that are incompatible with batteries can cause explosion, too.

**Adapted from http://www.towerfast.com/press/post/the-science-behind-exploding-cell-phones*

Glossary:

- **Overcharge**: To keep your cell phone connected even if the battery capacity is already full (100%).

Answer the following questions:

1. What sentence summarizes the information in the highlighted sentence in paragraph 1?
   a. Samsung repaired their phones, and people could use them again to call.
   b. Samsung took all the cell phones that were on stores back to their factories.
   c. Samsung lost many cell phones because they exploded in an incident.
   d. Samsung redesigned its Galaxy Note 7, and it didn't explode anymore.

2. Which element is described as unbalanced and responsive to high temperatures?
   a. Electrolytes
   b. Separators
   c. Battery
   d. Electrodes

3. What sentence explains the information in the highlighted part in paragraph 4?
   a. Your cell phone can fall on the ground, but it won't break.
   b. Water can penetrate your cell phone, but it won't get damaged.
   c. You can keep on using your cell phone, but the charge will not decrease.
   d. The cell phone can reach its maximum capacity, but nothing bad will happen.

4. What word can be inserted in the blank in paragraph 5?
   a. charge
   b. work
   c. explode
   d. relax

5. The word **as** in paragraph 5 can be replaced by
   a. like
   b. how
   c. while
   d. because

6. What is the main reason why cell phones explode? **Choose 2 options**.
   a. They are charged more than they should.
   b. Their separators are not properly built.
   c. Their batteries may have imperfections.
   d. Their electrodes are not put together.

7. The word **downside** in paragraph 6 is closest in meaning to
   a. danger
   b. shortness
   c. reduction
   d. disadvantage

8. What's the problem with ionic fluid?
   a. It decreases the life of the battery.
   b. It may explode as well.
   c. It damages the cell phone.
   d. It does not charge the phone well.

Here are some sentences from the text. In each case, complete the second sentence so that it means the same as the first. Do NOT use more than three words.

1. Cell phones are now one of the basic needs of people.
   Cell phones are so _____ for humans.

2. The electrolytes directly receive all the energy.
   All the energy _____ by the electrolytes.

3. The battery is like a rubber band.
   The battery is _____ to a rubber band.
4. Users should avoid using incompatible chargers.
   Incompatible chargers should _____.

What do you think?

What are some other dangers of using cell phones?