

## Things You Wanted to Know!

**Q1.** I would like to know what MIFARE technology is, and what is the difference between MIFARE card and RFID card technologies? Also, how can I test pH values of water? Which pH sensor is easily available in the market for measuring pH values of water?

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**A1.** Radio frequency identification (RFID) refers to small electronic devices that consist of a small chip and an antenna. An RFID device serves the same purpose as a barcode or magnetic strip on the back of a credit card or ATM card. It identifies the object on the basis of a unique identifier for that object. It is used for identification of objects or people and inventory management. An RFID card is usually used at homes and offices.

MIFARE technology is for smartcards. There are two criterion to define smartcards; one is the method of writing and reading card data and second is the type of chip implanted within the card and its capabilities. There are three types of cards: contact cards, contactless cards and multi-component cards.

Contact cards are the most common type of smartcards. These have contact area of approx. one square centimetre, comprising several gold-plated contact pads. These pads provide electrical connectivity when the card is inserted into a reader.

Contactless cards are proximity cards (these do not touch). These communicate with and are powered by the reader through RF induction. RFID cards, radio frequency integrated circuit (RFIC) cards and MIFARE cards are all contactless cards.

The MIFARE name is derived

from the term Mikron FARE Collection System, which is the trademark of NXP Semiconductors. These employ an RFID between the card and reader and so do not require insertion of the card. Instead, the card is passed along the exterior of the reader and read.

A contactless smartchip based device includes an embedded secure microcontroller or equivalent intelligence, internal memory and a small antenna, and communicates with a reader through a contactless RF interface. The contactless interface provides users with the convenience of allowing the contactless device to be read at short distances with fast transfer of data. A MIFARE card has a much larger memory than an RFID card and is widely used in hotels as payment cards and for identification purposes.

MIFARE family available for smartcard solutions are MIFARE Classic, MIFARE Plus, MIFARE DESire and MIFARE Ultralight. These offer more than 40 different applications, some of which are limited-use tickets in public transport (single and multiple trip tickets, tourist weekend passes), event ticketing (stadiums, exhibitions, amusement parks), loyalty and closed-loop payment schemes, access management, employee cards, school cards, citizen cards and for car parking.

In brief, MIFARE technology, a trademark of NXP Semiconductors, is used for contactless smartcards and is RF-enabled. Whereas, RFID is also RF-enabled but is used for identification purposes.

The pH value of water can be measured using the following methods:

**Using pH meter.** The probe of the meter is dipped in water and the value is read from the display, which gives a direct reading of pH value.

**Use of pH strips.** pH strips contain a series of indicator bars that change colour after exposure to a solution. Strength of the acids and bases on each bar differs. After the bars

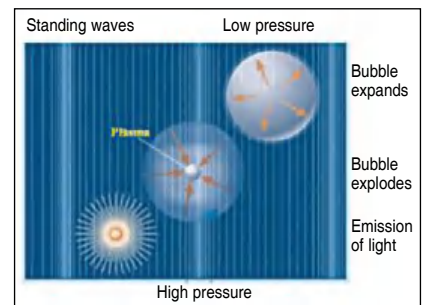
change colour, it can be matched with the key that comes with the kit. For selecting a pH sensor, you may check out Sensorex; it is also available online.

**Q2.** What is bubble power? How is bubble power derived from sonofusion technology?

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**A2.** Bubble power is a method of generating energy. It works under the principle of sonofusion, which is technically known as acous-



Bubble power

tic inertial confinement fusion. It is derived from a related phenomenon, sonoluminescence, where a source of sound, which is attached to a liquid-filled flask, sends pressure waves through the fluid, exciting the motion of tiny gas bubbles. The bubbles periodically grow and collapse due to extreme temperatures inside the bubble, producing visible flashes of light that last less than 50 picoseconds.

Chemical reactions occur during cavitations of a single, isolated bubble and yield photons, radicals and ions. That means, gas bubbles in a liquid can convert sound energy into light. For several years the sonofusion research teams from various organisations have joined forces to create acoustic fusion (AFTEC) to promote the development of sonofusion. Sonofusion may one day become a revolutionary new source of energy.

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