October 24, 2017

Q.1) Recently, a molecule E2D was in news. Consider the following statements

1. It is found in mammalian blood
2. It gives blood its characteristic metallic odour
3. It is used by predators to locate blood or prey

Select the correct statements

a) 1 and 2
b) 2 and 3
c) 1 and 3
d) All of the above

Q.1) Solution (d)

trans-4,5-Epoxy-(E)-2-decenal is an oxygenated α,β-unsaturated aldehyde found in mammalian blood that gives blood its characteristic metallic odor. It is used by predators to locate blood or prey. Humans can smell it at a concentration of 1.5 pg/l in air, at 15 ng/L in water and 1.3µg/L in oil. It was permitted as a food flavouring in the EU until it was prohibited on 11 July 2017.

The chemical is released when lipids in blood break down after being exposed to air.

Source: https://phys.org/news/2017-10-scientists-blood-molecule-wolves-repels.html

Q.2) Consider the following statements about 'Paika Rebellion'

1. It was led by Bakshi Jagabandhu Bidyadhar
2. It took place when the British East India company wrested the rent-free land that had been given to the Paiks for their military service to the Kingdom of Khurda

Select the correct statements

a) 1 Only
b) 2 Only
c) Both 1 and 2
d) Neither 1 nor 2

Q.2) Solution (c)

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A valiant uprising of soldiers led by Buxi Jagabandhu (Bidyadhar Mohapatra) took place in Khurda of Odisha.

It was the Paika Revolution of 1817, headed by their redoubtable leader Jagabandhu Bidyadhar Mohapatra Bhramarbar Rai, more popularly known as Bakshi Jagabandhu of Khurda. Jagabandhu was a jagirdar under the King of Khurda and Killa Rorang was his familial estate. "Bakshi" was a title given to military leaders, who functioned much like the mansabdars under the Mughals.

The Paikas were the traditional landed militia of Odisha. They functioned as soldiers during war and had policing duties in peacetime. There were three types of Paiks - the Paharis who were basically swordsmen, the Banuas or gunmen (matchlock men rater) and the archers classified as the Dhenkiyas.

When armies of the East India Company overran most of Odisha in 1803, the Raja of Khurda lost his primacy and the power and prestige of the Paikas went on a decline. The British were not comfortable with these aggressive, warlike new subjects and set up a commission under Walter Ewer to look into the issue.

The last lines of Ewer's report succinctly sum up what was coming for the Paikas - he concluded his report by saying "... unless the Paik community is ruined completely, British rule cannot run smoothly".

The commission recommended that the hereditary rent-free lands granted to the Paikas be taken over by the British administration and this recommendation was zealously adhered to. However, the rebellion had several other underlying causes - like the rise in the price of salt, abolition of the cowrie currency for payment of taxes and an overtly extortionist land revenue policy.

The immediate trigger for the rebellion probably came in March 1817, when a body of around 400 swordsmen from Gumsur came to Khurda and revolted openly against the Company's rule. The Paiks under Jagabandhu joined them and proceeded to Khurda.

Although initially the Company struggled to respond they managed to put down the rebellion by May 1817. Many of the Paik leaders were hung or deported. Jagabandhu would surrender in 1825 and was still a prisoner when he passed away in 1829. Peace never really returned to Odisha as local insurgencies kept flaring up, like the one in Tapanga in 1827 and Banapur in 1835.

Source: http://www.thehindu.com/todays-paper/tp-national/paika-bidroha-to-be-named-as-1st-war-of-independence/article19909264.ece

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Q.3) Consider the following statements about Water fluoridation

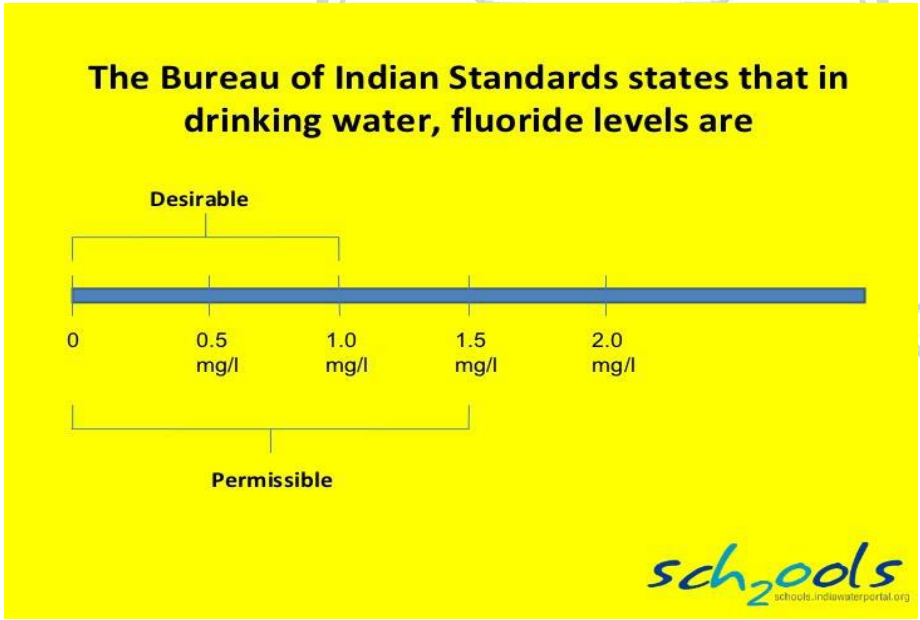
1. Low levels of fluoride in drinking water (0.5 to 1 mg/l) protect against dental caries
2. High levels of fluoride in drinking water (above 1.5 mg/l) lead to dental and skeletal fluorosis

Select the correct statements

a) 1 Only
b) 2 Only
c) Both 1 and 2
d) Neither 1 nor 2

Q.3) Solution (c)

Water fluoridation is the controlled addition of fluoride to a public water supply to reduce tooth decay. Fluoridated water contains fluoride at a level that is effective for preventing cavities; this can occur naturally or by adding fluoride. Fluoridated water operates on tooth surfaces: in the mouth, it creates low levels of fluoride in saliva, which reduces the rate at which tooth enamel demineralizes and increases the rate at which it remineralizes in the early stages of cavities.



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Fluoride

- Low levels of fluoride in drinking water (0.5 to 1 mg/l) protect against dental caries
- High levels of fluoride in drinking water (above 1.5 mg/l) will lead to adverse health impacts ranging from dental fluorosis to skeletal fluorosis
- Fluoride levels in water beyond desirable / permissible limits is typically found in groundwater and not surface water

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Other symptoms

- Fatigue
- Low hemoglobin count
- Irritation
- Loss of appetite
- Excessive thirst and urination
- Miscarriage
- Inability to conceive due to defective sperm
- Depression

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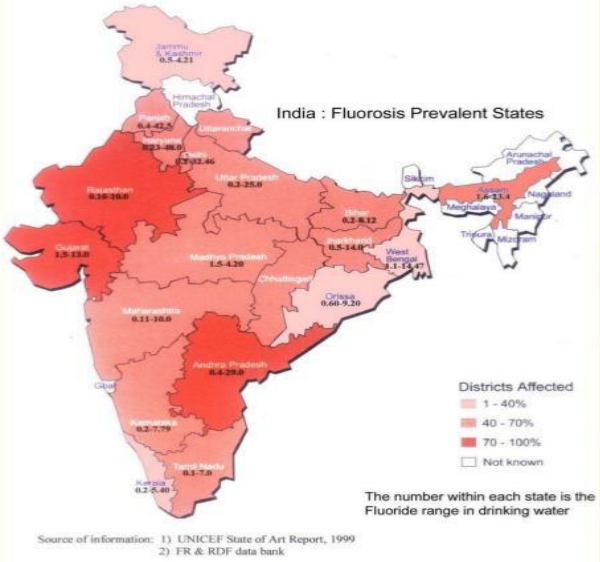

Fluoride levels in groundwater are higher than permissible limits in **19 states** of India

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News:

- Researchers at the Indian Institute of Technology (IIT) Hyderabad have used activated jamun seed powder to bring the fluoride content in drinking water to less than the WHO limit of 1.5 mg per litre.
- The activated jamun seed acquires a positive charge at low pH and the positive charge attracts the fluoride ions while the negative charge in an alkaline medium repulses the fluoride ions.
- The fluoride ion removal increases with a decrease in pH, with maximum adsorption found at pH 3.
- They tested it using groundwater taken from Nalgonda village, which is one of the worst fluoride-affected villages in India.
- The fluoride content was successfully reduced to 1.5 mg per litre in the groundwater.

Source: http://www.thehindu.com/sci-tech/science/iit-hyderabad-uses-activated-jamun-to-remove-fluoride-from-water/article19896298.ece

Q.4) Singur, a rural block in West Bengal's Hooghly district was in news recently due to

a) Butterfly and Frogs Diversity
b) New butterfly species 'Banded Tit'
c) New species of Zingiber with medicinal properties
d) None of the above

Q.4) Solution (a)

According to the recent study by Zoological Survey of India, Singur in West Bengal's Hoogly district is home to atleast 69 species of Butterflies. Five of the species found in Singur are rare and to be protected under the Wildlife (Protection) Act, 1972. They include species like the Tree Flitter, Striped Albatross, Pea Blue, Common Indian Crow and Danaid Eggfly.

Singur is not only rich in butterfly diversity but also in the diversity of frogs and birds.

It has no forested land and the area is known for rice, potato and vegetable cultivation.

Source: http://www.thehindu.com/todays-paper/tp-national/butterflies-are-more-than-a-nano-attraction-in-singur/article19899383.ece

Q.5) Which of the following statements about Particulate Matter is INCORRECT?

a) It is the sum of all solid and liquid particles suspended in air including both organic and inorganic particles
b) Particulate matter present in air is divided into different categories depending on the size of the particles.
c) PM 2.5 is an atmospheric particulate matter of diameter of fewer than 2.5 micrometres, which is around 3 per cent the diameter of a human hair
d) None of the above

Q.5) Solution (d)

Particulate matter is the sum of all solid and liquid particles suspended in air many of which are hazardous. This complex mixture includes both organic and inorganic particles, such as dust, pollen, soot, smoke, and liquid droplets. These particles vary greatly in size, composition, and origin.

Particulate matter present in air is divided into different categories depending on the size of the particles (aerodynamic diameter).

Fine particles are airborne particles which are smaller than coarse particles. They have an aerodynamic diameter of 2.5 µm or less (PM2.5). The fine particles which are smaller than 0.1 µm are referred to as ultrafine particles (PM0.1).

Fine particles are largely formed from gases.

Ultrafine particles are formed by nucleation, which is the initial stage in which gas becomes a particle. These particles can grow up to a size of 1µm either through condensation, when additional gas condensates on the particles, or through coagulation, when two or more particles combine to form a larger particle.

Please note that ultrafine particles (PM0.1) are part of the fine fraction (PM2.5).

PM0.1 is particulate matter with an aerodynamic diameter of up to 0.1 µm, referred to as the ultrafine particle fraction.

PM2.5 is particulate matter with an aerodynamic diameter of up to 2.5 µm, referred to as the fine particle fraction (which per definition includes the ultrafine particles).

PM10 is particulate matter with an aerodynamic diameter of up to 10 µm, i.e. the fine and coarse particle fractions combined.

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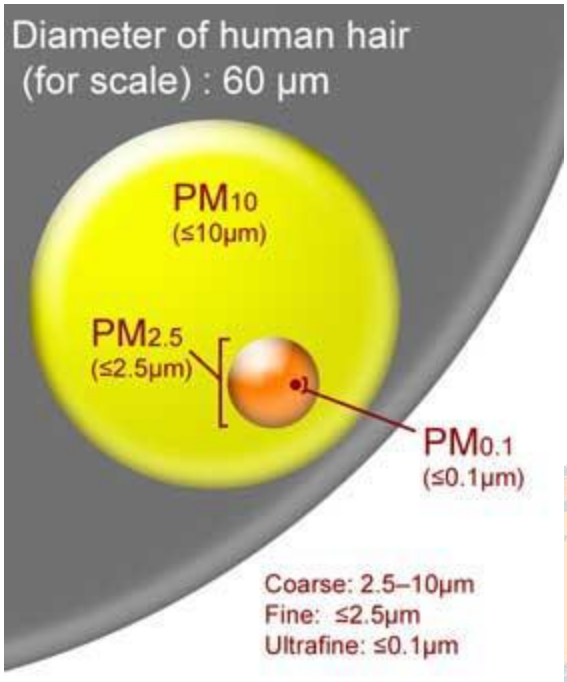

Source: http://indianexpress.com/article/what-is/post-diwali-pm-2-5-gets-into-delhi-air-badly-what-are-pm2-5-and-the-effect-4899768/