Prelim Bits 30-01-2017

Vanadium dioxide (VO2):

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- Vanadium dioxide (VO2) is a metal with ability to switch from insulator to conductive metal at the temperature of 67 °C.
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- Researchers now found that this metal would conduct electricity without conducting heat.
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- It contradicts the working of all other conductors which usually conducts heat when it conducts electricity i.e against the **Wiedemann-Franz Law**.
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- The law states that good conductors of electricity will also be proportionally good conductors of heat, which is why things like motors and appliances get so hot when you use them regularly.
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Ocean acidification and shell formation:

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- The surface layer of the ocean is in equilibrium with the atmosphere.
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- Thus any increase in carbon dioxide (CO2) in atmosphere also increases the CO2 content in the ocean which further decreases the pH and results in ocean acidification.
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- Ocean acidification makes the shellfish and corals difficult to form limestone because acidification causes calcium carbonate to dissolve easily in acidic water.
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$CO_2 + H_2O$ H_2CO_3 (Carbonic acid) $H^+ + HCO_3^-$ (Bicarbonate ions)

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- Now researchers found a species “single-celled shellfish foraminifera” which makes their shells better in acidic water.
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- Foraminifera expel large amounts of hydrogen ions through their cell wall and take up the increased concentration of CO2 quickly through its cell wall.
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- A low acidity prevails inside the organism due to the massive excretion of protons. Under these conditions the ingested carbon dioxide is again converted to carbonate, which reacts with calcium to form lime.
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Rail Safety Fund:

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- The new rail safety fund called “**Rashtriya Rail Sanraksha Kosh**” to be utilized for track improvement, bridge rehabilitation work, improved inspection work etc.
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- It is a non-lapsable fund created by Ministry of Finance, since the union and railway budgets will be merged for the first time.
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- It receives fund from this year budget allocation and also from the Central Road Fund.
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- The Central Road Fund is collected by levying Cess on diesel and petrol for safety-related work.
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- The Rail Safety Fund was setup based on the recommendation of a committee headed by Anil Kakodkar, former chairman of Atomic Energy Commission Chairman.
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