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New Technique to Produce Hydrogen

Scientists at the University of California Santa have developed a new method to efficiently generate hydrogen from water at ambient temperatures using post-consumer aluminium and gallium.

- **Aluminium** - As Aluminium is a highly reactive metal, aluminium nanoparticles can easily reacts with the oxygen molecules in water to release hydrogen gas.
- However, the pure form of the metal is so reactive that it instantly reacts with air to create a coating of aluminium oxide (alumina) on its surface.
- This means that the metal cannot react with water. That is where gallium comes in.
- **Gallium** - Gallium is liquid at slightly above room temperature and it removes the alumina coating that forms on aluminium.
- This allows aluminium to be in direct contact with the water and react with it.
- The researchers found that a **3:1 ratio** of gallium and aluminium in the composite was the optimum ratio for the highest hydrogen production.
- The Alumina that is formed have many applications including in spark plugs, abrasion-resistant tiles and cutting tools.
- **Significance** - The worldwide push for electric vehicles has largely focused on battery electric vehicles (BEVs), which typically use lithium-ion batteries to store electricity in order to propel the vehicle.
- An alternate technology involves the use of "hydrogen fuel cells" to generate electricity from hydrogen and use that to power the vehicle.
- Hydrogen fuel cell vehicles present some advantages over BEVs - they can be refuelled with hydrogen as fast as a conventional vehicle can be refilled with fossil fuels.
- In addition, they reduce dependence on minerals like lithium and cobalt, which are used to produce lithium-ion batteries.
- Therefore, this new technology for producing hydrogen can be used to scale up to produce hydrogen in commercial quantities.

Reference

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i-Banks

Large i-banks are getting picky about initial public offerings (IPOs). So, smaller i-banks join the big-fat IPO party.

Investment banking is a special segment of banking operation that helps individuals or organisations raise capital and provide financial consultancy services to them.

- Investment bank (i-bank) is a financial services company that acts as an **intermediary in large and complex financial transactions**.
- This bank is usually involved,
    1. When a startup company prepares for its launch of an IPO and
    2. When a corporation merges with a competitor.
- It offers storefront community banking and also caters to the investment needs of high-net-worth individuals.

Global investment banks include JPMorgan Chase, Goldman Sachs, Morgan Stanley, Citigroup, Bank of America, Credit Suisse, and Deutsche Bank.

- **Working** - Advisory division of an i-bank is paid a fee for its services.
- Trading division earns commissions based on its market performance.
- Retail banking divisions make money by loaning money to consumers and businesses.
- Professionals who work for investment banks may have careers as financial advisors, traders, or salespeople.
- Investment banks are best known for their work as **intermediaries between a corporation and the financial markets**.
- That is, they help corporations issue shares of stock in an IPO or an additional stock offering.
- They also arrange debt financing for corporations by finding large-scale investors for corporate bonds.

A 'Chinese wall' is supposed to separate investment banking activities from the company's trading division to prevent conflicts of interest.

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Electric Highways

The Union Ministry of Road Transport and Highways is working on developing electric highways.

- An electric highway generally refers to a road that supplies power to vehicles travelling on it, including through overhead power lines.
- The electric highways that will be developed by the Indian government will be **powered by solar energy**, which will facilitate the charging of heavy-duty trucks and buses while running.

Around 3 crore trees would be planted across the national highways. The government is formulating a new policy called Tree Bank for tree cutting and plantation.

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Index Funds

- An index fund is a type of **mutual fund** or exchange-traded fund (**ETF**) with a portfolio constructed to match or track the components of a financial market index, such as the S&P's 500 Index.
- An index fund is a portfolio of stocks or bonds designed to mimic the composition, returns, and performance of a financial market index.
- For example, a Nifty 50 Index Fund will replicate the Nifty50 index.
- **Benefits** -An index mutual fund is said to provide broad market exposure, low operating expenses, and low portfolio turnover.
- These funds follow their benchmark index regardless of the state of the markets.
- Index funds follow a passive investment strategy.

> *Index funds seek to match the risk and return of the market based on the theory that in the long term, the market will outperform any single investment.*

- **Measuring Market index** - A market index measures the performance of a "basket" of securities (like stocks or bonds), which is meant to represent a sector of a stock market, or of an economy.
- You cannot invest directly in a market index, but because index funds track a market index they provide an **indirect investment option**.

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AT-1 Bonds

Two years after the YES Bank fiasco, Additional tier-1 (AT1) bonds are once again gaining popularity.

> *After the YES Bank fiasco, the Securities and Exchange Board of India curtailed retail participation by increasing their face value to ~1 crore.*

- Additional Tier-1 bonds (AT-1 bonds) are a type of unsecured **perpetual debt instrument.**

- They are used by the banks to augment their core equity base and thus comply with Basel III norms.
- AT-1 includes perpetual non-cumulative preference shares and perpetual bonds.

AT-1 bonds were introduced by the Basel accord after the global financial crisis to protect depositors.

- **Features of the AT1 bonds** - AT-1 bonds are **perpetual** in nature - they do not carry any maturity date.
- They offer **higher returns** to investors but compared with other vanilla debt products, these instruments carry a higher risk as well.
- If the capital ratios of the issuer fall below a certain percentage or in the event of an institutional failure, the rules of the RBI allow the issuer to **stop paying interest or even write down** these bonds.
- These bonds are **subordinate to all other debt** and senior only to equity.
- **Quasi-equity feature** - To lend more, banks need to shore up their equity capital. However, issuing additional equity would dilute the bank's return on equity.
- Instead, the banks issue AT1 bonds, which they can treat as equity for calculating their tier 1 capital.

Risks involved with AT1 Bonds

- Key risk of AT1 bonds arises from its '**loss absorption**' feature.
- When a bank is being restructured or liquidated, the order of repayment is as follows: FD holders, secured debt, unsecured or subordinate debt, and perpetual debt (AT1 bond) holders.
- The AT1 bonds rank last in repayment - just before equity - that makes them the riskiest among fixed-income securities.
- This risk reduces in the case of banks having stronger fundamentals.

Compared to the normal bonds of the same bank, AT1 bonds would be riskier, which is why they offer a higher rate of return.

- Another risk arises from '**coupon discretion'**.
- In the case of AT1 bonds, the payment of the coupon depends on whether the bank has profits. It can also dip into its reserves to pay coupons.
- In normal bonds and debentures, payment of coupon is not contingent on whether the issuer is in profit or loss.
- Non-payment of coupon has not happened to date in AT1 bonds, but the risk exists.
- **Call option Risk** - As AT1 bonds do not have a maturity date, the banks have a call option that permits them to redeem these bonds after a certain period.
- The issuer bank can recall them after five years (or subsequently on the anniversary of issuance).
- If the bank exercises its call option when interest rates are going down, that subjects the investor to reinvestment risk.

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