



High-grade lithium discovered in Nigeria

For Prelims: High Grade Lithium, spodumene and lepidolite, Electric Vehicles

For Mains: Applications of Lithium, Lithium in India, Steps taken by India to reduce import of Lithium

Why in News?

Recently, **High-grade Lithium** has been discovered in Nigeria.

- **Greenbushes mine** in **Western Australia** is the **largest hard-rock Lithium mine** in the world.
- The largest importers of lithium are **South Korea, China, Japan, US and Belgium**.

What are the Key Highlights of Lithium?

▪ About:

- Lithium is an element and in nature tends to concentrate sufficiently in the two minerals, **spodumene and lepidolite**.
- They are usually **found in specialised rocks called rare and greisens**.
- The **Geological Agency** described lithium **as high grade** because it is found with 1-13% oxide content. Normally exploration begins at levels as low as 0.4%.
 - **Grade (in %) is a measure of the concentration of lithium in the minerals and or rocks that contain it.**
 - Therefore, the **higher the grade the more the economic viability**. Higher grades are very rare for metals like lithium.

▪ Applications:

- **Special Glasses and Ceramics:**
 - **Lithium disilicate ($\text{Li}_2\text{Si}_2\text{O}_5$)** is a chemical compound that is a glass ceramic.
 - It is widely used as a dental ceramic due to its **strength, machinability and translucency**.
- **Alloy Making:**
 - Lithium metal is used to make useful alloys.
 - For example, with lead to make '**white metal**' bearings for motor engines, with aluminium to make aircraft parts, and with magnesium to make Armour plates.
- **Rechargeable batteries:**
 - **Lithium is used in rechargeable batteries for mobile phones, laptops, digital cameras and electric vehicles.** Lithium is also used in some non-rechargeable batteries for things like heart **pacemakers, toys and clocks**. The different types of batteries are:
 - **Lithium-cobalt oxide battery:** It is used in **consumer electronics** and is being applied in **electric vehicles**. It is relatively cheap.
 - **Lithium-nickel-manganese-cobalt:** It is a newer, higher performing range of battery chemistry. It is mainly developed for the electronic vehicle market but is finding a wider use because of its increasing cost

effectiveness.

- **Lithium iron phosphate:** It is the safest technology with relatively **high performance but relatively expensive**. It is very popular in China.
- **Lithium-nickel-cobalt-aluminium oxide:** It is developed **to reduce cobalt consumption** and is known as a solid performer and of reasonable cost. It is also **becoming popular outside China**.

▪ **High Demand:**

- Due to the growing interest in **clean energy**, the **demand for lithium has skyrocketed as most countries draw plans to phase out fossil fuel and switch to zero emission electric vehicles**.
 - Lithium production globally grew from 28,100 metric tonnes in 2010 to 86,000 in 2019. The challenge will be in supplying the market with enough lithium.

▪ **Lithium in India:**

- Researchers at the **Atomic Minerals Directorate (under India's Atomic Energy Commission)** have estimated **lithium reserves of 14,100 tonnes** in a small patch of land surveyed in **Southern Karnataka's Mandya district**.
 - Also, to be **India's first ever Lithium deposit site**.

What are the Steps taken by India to reduce import of Lithium?

- India has adopted a **multi-modal strategy to reduce its dependence on imported lithium** and give fresh impetus to the growth of the **local electric vehicles (EV) industry**.
- State-run **Khanij Bidesh India Ltd (KABIL)** is working with the authorities in **Argentina, Chile, Australia and Bolivia** for acquiring lithium and cobalt mines overseas.
 - These nations are rich in lithium reserves.
- The country is also working on **urban mining** where recycled materials remain in circulation and this reduces the dependency on fresh lithium inputs. This will further bring down the requirement for imports.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. Which one of the following pairs of metals constitutes the lightest metal and the heaviest metal, respectively? (2008)

- (a) Lithium and mercury
- (b) Lithium and osmium
- (c) Aluminium and osmium
- (d) Aluminium and mercury

Ans: (b)

Exp:

- Light metals are metals of low atomic weight while heavier elements generally have high atomic weight.
- Osmium is a hard metallic element which has the greatest density of all known elements. Osmium has an atomic weight of 190.2 u and its atomic number is 76.
- Lithium having an atomic number 3 and atomic weight of 6.941u is the lightest known metal.
- Therefore, option (b) is the correct answer.

Source: DTE

