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## Rare earth metals at the heart of China-U.S. rivalry

### **Context:**

At a time of frequent geopolitical friction among the three powers of China, U.S. and Europe – U.S. and Europe want to avoid this scenario by investing in the market for 17 minerals with unique properties that today are largely extracted and refined in China.

### **Relevance:**

GS-I: Geography (Distribution of Key Natural Resources, Mineral & Energy Resources), GS Paper-II: International Relations (India and its Neighborhood)

### **Dimensions of the Article:**

1. What are REMs?
2. Heavy dependence
3. Rare Earth Minerals Reserves – India Ranks 3rd in the World

### **What are REMs?**

- The rare earths minerals (REM) are a set of seventeen metallic elements. These include the fifteen lanthanides on the periodic table in addition to scandium and yttrium that show similar physical and chemical properties to the lanthanides.
- The REMs have unique catalytic, metallurgical, nuclear, electrical, magnetic and luminescent properties. While named 'rare earth', they are in fact not that rare and are relatively abundant in the Earth's crust.



### **Strategic importance of REMs:**

- They have distinctive electrical, metallurgical, catalytic, nuclear, magnetic and luminescent properties.
- Its usage range from daily use (e.g., lighter flints, glass polishing mediums, car alternators) to high-end technology (lasers, magnets, batteries, fibre-optic telecommunication cables).
- Even futuristic technologies need these REMs (For example high-temperature superconductivity, safe storage and transport of hydrogen for a post-hydrocarbon economy, environmental global warming and energy efficiency issues).
- Due to their unique magnetic, luminescent, and electrochemical properties, they help in technologies perform with reduced weight, reduced emissions, and energy consumption; therefore give them greater efficiency, performance, miniaturization, speed, durability, and thermal stability.

### **Heavy dependence**

- In 2019, the U.S. imported 80% of its rare earth minerals from China, the U.S. Geological Survey says.
- The EU gets 98% of its supply from China, the European Commission said last year.
- Amid the transition to green energy, in which rare earth minerals are sure to play a role, China's market dominance is enough to sound an alarm in western capitals.
- Rare earth minerals, with names like neodymium, praseodymium and dysprosium, are crucial to the manufacture of magnets used in industries of the future, such as wind turbines and electric cars. And they are already being used in consumer goods such as smartphones, computer screens and telescopic lenses.
- In 2021 the U.S. Senate passed a law aimed at improving American competitiveness that includes provisions to improve critical minerals supply chains.
- U.S. aims to boost production and processing of rare earths and lithium, another key mineral component, while "working with allies to increase sustainable global supply and reduce reliance on competitors," Deputy Director of the National Economic Council in 2021.
- The best hope for boosting American production can be found at the Mountain Pass mine in California.
- Once one of the major players in the sector, the mine suffered as China rose and ate up its market share, aided by Beijing's subsidies.
- China is expected to remain dominant for some time to come, but experts say that if recycling is scaled up, "20 to 30% of Europe's rare earth magnet needs by 2030 could be sourced domestically in the EU from literally zero."



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## Rare Earth Minerals Reserves – India Ranks 3rd in the World

- India has the third-largest reserves of rare earth minerals in the world. Due to radioactivity of monazite sands, Indian Rare Earths Ltd under the Department of Atomic Energy is the sole producer of rare earth compounds.
- Globally, China has a monopoly over rare earth, after USA's recede in this industry due to high environmental and health concerns.
- China had once, almost shivered the Japanese economy by halting the export of rare earth elements.
- India is also blessed with some crucial rare earth minerals like zirconium, neodymium etc., available in plenty in monazite sands.
- This could contribute to Indian export markets if utilized properly. However, owing to various reasons such as cost reduction due to high production (economies of scale) in China, lack of demand in the domestic market, lack of domestic processing technologies, the production of rare earth minerals has depleted over years.
- Most of the products that use rare earth minerals as raw materials are imported. Despite rare earth minerals having high value add the potential for export growth, inadequate processing technologies have made India suffer.

*-Source: The Hindu*