FROM HOUSEHOLD APPLIANCES TO MEDICAL DEVICES: THE ROLE OF RARE EARTH ELEMENTS IN MODERN TECHNOLOGY

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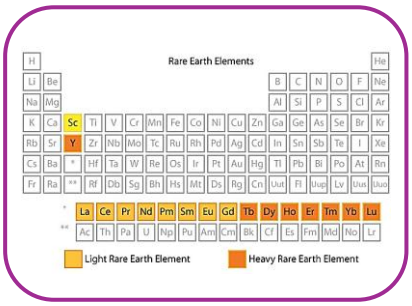
RARE EARTH ELEMENTS (REE)

Lanthanum (La)
Cerium (Ce)
Praseodymium (Pr)
Neodymium (Nd)
Promethium (Pm)
Samarium (Sm)
Europium (Eu)
Gadolinium (Gd)
Terbium (Tb)
Dysprosium (Dy)
Holmium (Ho)
Erbium (Er)
Thulium (Tm)
Ytterbium (Yb)
And Lutetium (Lu)

In addition, yttrium (Y) and scandium (Sc) are often grouped with the lanthanides and referred to as REE.



As high technology develops, demand for rare earth metals increases each year. This is particularly evident in the search for clean energy sources and the development of various electronic devices.

In 2021, global production of rare earth elements reached 280,000 tonnes, a significant increase compared to 2018, when 110,000 tonnes fewer were mined.

REE ARE CRUCIAL COMPONENTS OF HIGH-TECH DEVICES, WHICH IS WHY THEY ARE SOMETIMES REFERRED TO AS THE "VITAMINS" OF THE MODERN ECONOMY OR INDUSTRY.

HOUSEHOLDS

Smartphones and tablets
Nd and Pr are used in powerful magnets for speakers, motors, and vibration mechanisms. La and Ce are used in lighting and optical components, such as displays and cameras.

Computers and laptops
Nd is used in fans, speakers, and other components. Ce and La are used in various components, including optical systems and displays. Eu and Tb are used in advanced displays.

Televisions and displays (LCD, OLED)
Tb, Eu and other rare earth elements are used to enhance colour properties and increase the brightness of displays.

LED lights and displays
Tb and Eu are used in colour displays, televisions, and LED lights. Ce is widely used in LED technology to improve brightness and efficiency.

Electronic devices (computer modems, printers)
REEs are found in various electronic components, magnets, optical elements, and some capacitors.
Nd and Pr are essential in hard drive magnets and optical devices for reading and writing data.

Solar cells and renewable energy sources
Ce and other rare earth elements are used in certain components of solar cells to enhance performance.

From: https://www.solarmelon.com/articles/solar-energy-renewable/

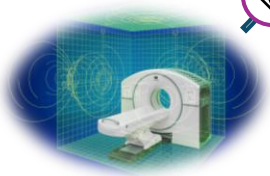
Electric cars
Nd, Dy, and other REE are used in small amounts in the batteries and electric motors that power electric cars, and their use is gradually increasing as electric vehicles become more popular.

MEDICINE

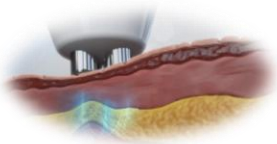
- Portable X-ray instruments
- X-ray tubes
- Magnetic resonance imagery (MRI) contrast agents
- Nuclear medicine imaging
- Cancer treatment applications
- Genetic screening tests
- Medical and dental lasers

From: https://openmedscience.com/radiant-discovery-the-transformative-journey-of-x-ray-technology-in-medicine-and-science/

From: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/nuclear-magnetic-resonance-imaging



From: https://openmedscience.com/nuclear-medicine-imaging/



From: https://www.gophotonics.com/community/lasers-for-medical-applications

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