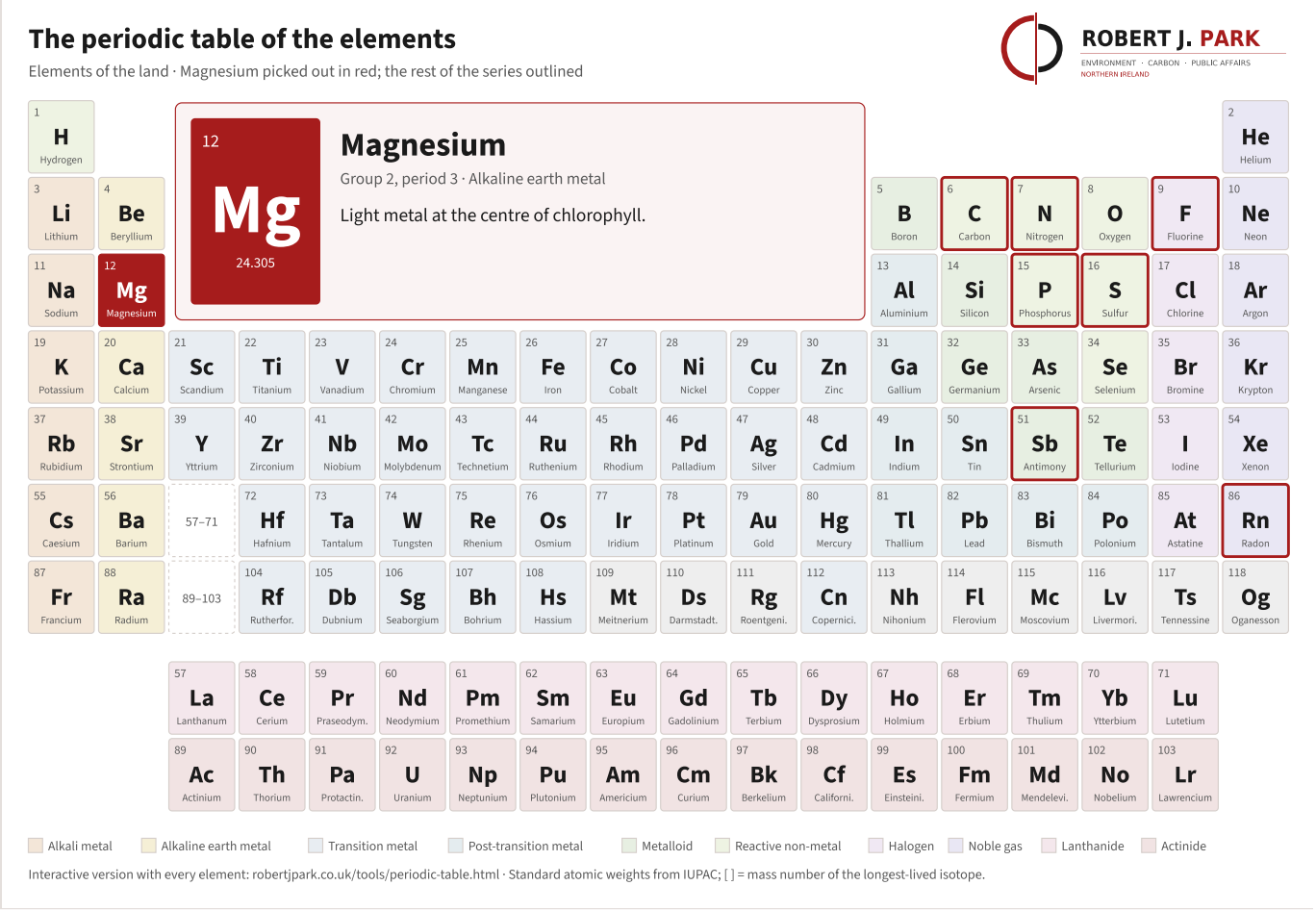
LEARNING BRIEFING · CLIMATE · SOIL · LAND · AGRI-FOOD · ATMOSPHERE

Magnesium: the metal in every leaf and the cause of grass staggers

Element 12 sits at the centre of every chlorophyll molecule. A cow short of it on lush spring grass can be dead by morning.



Magnesium in the full periodic table. Interactive version with every element: robertjpark.co.uk/tools/periodic-table.html

Look at a field of grass and you are looking at magnesium. Each molecule of chlorophyll, the green pigment that captures sunlight, is built around a single magnesium atom. Without magnesium there is no photosynthesis, and no farming.

Magnesium is also a light, strong metal, a fire hazard as powder or swarf, a soil conditioner as dolomitic lime, and a possible tool for removing carbon dioxide from the air.

The element in one minute

- **Number 12**, group 2, period 3. An alkaline earth metal.
- **Abundant:** the eighth most common element in the Earth's crust, and dissolved in seawater at about 1.3 grams per litre.
- **Critical:** magnesium and magnesite are on the UK's 2024 critical minerals list. Most magnesium metal is made in China.

Climate

- **Making the metal is carbon intensive.** Most magnesium is made by the Pidgeon process, which uses a lot of heat, often from coal.
- **Calcining magnesite releases CO_2**, just as limestone does in cement.
- **Rock weathering can draw CO_2 down.** Magnesium-rich rocks such as basalt and olivine react slowly with carbon dioxide in rainwater. Spreading crushed rock on farmland to speed this up, "enhanced rock weathering", is being trialled as a carbon removal method. It is still at the research stage, and measuring how much carbon it actually removes is hard.
- **Light-weighting:** magnesium alloys make vehicles lighter, so they use less energy.

Soil and land

Magnesium comes from weathered rock, especially basalt and dolomite. Northern Ireland's Antrim Plateau is built of basalt lava flows, rich in magnesium-bearing minerals.

Soils are tested for magnesium alongside phosphorus and potassium. Where magnesium is low and lime is needed, dolomitic (magnesian) limestone supplies both. Heavy potassium dressings make it harder for grass, and the animals eating it, to take up magnesium.

Agri-food

Grass tetany, also called grass staggers or hypomagnesaemia, is the reason magnesium matters to every livestock farmer.

- **Cattle and sheep cannot store magnesium.** They need a steady daily supply.
- **Lush spring grass is low in it**, especially where nitrogen and potassium have been applied heavily, and passes through the gut fast.
- **Bad weather triggers it.** A cold, wet spell stops animals grazing. AFBI's guidance notes that a sudden turn in the weather can cause severe outbreaks, and that lactating cows on spring and autumn grass are most at risk.
- **Prevention** is by supplementing magnesium (in feed, licks, water or boluses) through the risk period. Any animal with signs of tetany is a veterinary emergency.

Atmosphere

Magnesium has no direct role in the atmosphere. Sea spray carries magnesium salts inland, which is one reason coastal pastures differ from inland ones.

Why it matters in Northern Ireland

Spring-calving suckler and dairy herds on fast-growing ryegrass are exactly the setting for grass tetany. And with basalt quarries across Antrim, Northern Ireland has a ready source of magnesium-rich rock dust, which is why enhanced rock weathering attracts local interest. Claims of carbon removal from it should be treated with care until measurement standards settle.

The rules (as at 21 November 2026)

- **Workplace:** COSHH applies to magnesium oxide dust and fume. Magnesium powder and swarf need fire and dust-explosion controls (DSEAR).
- **Classification:** magnesium powder has harmonised CLP classifications for fire and reaction with water (see table).
- **Carbon removal:** the EU's Carbon Removals and Carbon Farming certification framework adopted its first methodologies in Delegated Regulation (EU) 2026/285 (in force 7 May 2026). The Commission lists enhanced rock weathering separately; its review was published in December 2025 (European Commission). No UK scheme certifies it.
- **Critical minerals:** magnesium is on the UK critical minerals list.

Safety and handling

COSHH applies to magnesium dust and fume and to magnesium oxide. The bigger risk is fire: magnesium powder and swarf are flammable and react with water to release hydrogen.

Form	Classification (CLP)
Magnesium powder (pyrophoric)	Pyr. Sol. 1 H250; Water-react. 1 H260 (releases flammable gas with water). Harmonised (CLP Annex VI).
Magnesium powder or turnings (stabilised)	Flam. Sol. 1 H228; Water-react. 2 H261. Harmonised (CLP Annex VI).
Magnesium (massive metal)	Not classified in solid form, but it burns once alight.

Substance	Workplace exposure limit (EH40/2005)
Magnesium oxide (as Mg)	10 mg/m^3 LTEL inhalable dust; 4 mg/m^3 LTEL respirable dust

UN number	Proper shipping name	Class
UN1418	Magnesium powder or magnesium alloys powder	4.3 (4.2)
UN1869	Magnesium or magnesium alloys (>50% Mg) in pellets, turnings or ribbons	4.1
UN1474	Magnesium nitrate	5.1

Risks of the element itself. Never use water or a CO_2 extinguisher on burning magnesium; use dry sand or a Class D powder. Machining swarf and fine powder are the main fire risks in workshops. Magnesium compounds in fertiliser and feed are of low hazard.

Classification and limits change. Always work from the supplier's current safety data sheet and your own COSHH assessment.

Compounds you will meet

Where you meet it	Compound	Why it matters
Nature	Chlorophyll	the green pigment in every leaf
	Dolomite ($CaMg(CO_3)_2$) and magnesite ($MgCO_3$)	carbonate rocks
	Olivine and serpentine	magnesium silicates in basalts and ultramafic rocks
	Magnesium in seawater	about 1.3 g per litre
Manufacturing	Magnesium oxide (MgO)	refractories, feed supplements, cements
	Magnesium sulfate (kieserite, Epsom salt)	fertiliser and medicine
	Magnesium hydroxide	flame retardant and wastewater treatment
	Magnesium chloride	de-icing and dust suppression
	Magnesium alloys	light-weighting of vehicles and electronics
Climate	Calcining magnesite	releases process CO_2, as with limestone for cement
	Enhanced rock weathering	spreading crushed basalt or olivine on land to draw down CO_2; research stage
	Light-weighting	lighter vehicles use less energy

What this means

- **For livestock farmers:** plan magnesium supplementation before turnout and before forecast cold snaps, not after the first case.
- **For engineering firms:** keep magnesium swarf dry, separate and away from water-based extinguishers.
- **For anyone offered rock-dust carbon credits:** ask how removal is measured, by whom, and over what period.

Sources

- AFBI (Veterinary Sciences Division), Grass tetany (hypomagnesaemia) in cattle (accessed 21 November 2026).
- British Geological Survey, UK 2024 Criticality Assessment (28 November 2024) and GOV.UK, Critical minerals technical annex (November 2025).
- HSE, EH40/2005 Workplace exposure limits (4th edition, January 2020).
- Regulation (EC) No 1272/2008 (CLP), Annex VI.
- UNECE, ADR 2025.

All sources checked 21 November 2026.

Online version: robertjpark.co.uk/blog/2026/11/magnesium-the-metal-in-every-leaf-and-the-cause-of-grass-staggers/

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General information as at 21 November 2026, not legal, safety or agronomic advice. Work from current safety data sheets and your own COSHH assessment. Created with assistive technology including AI and re-checked against the official sources listed.