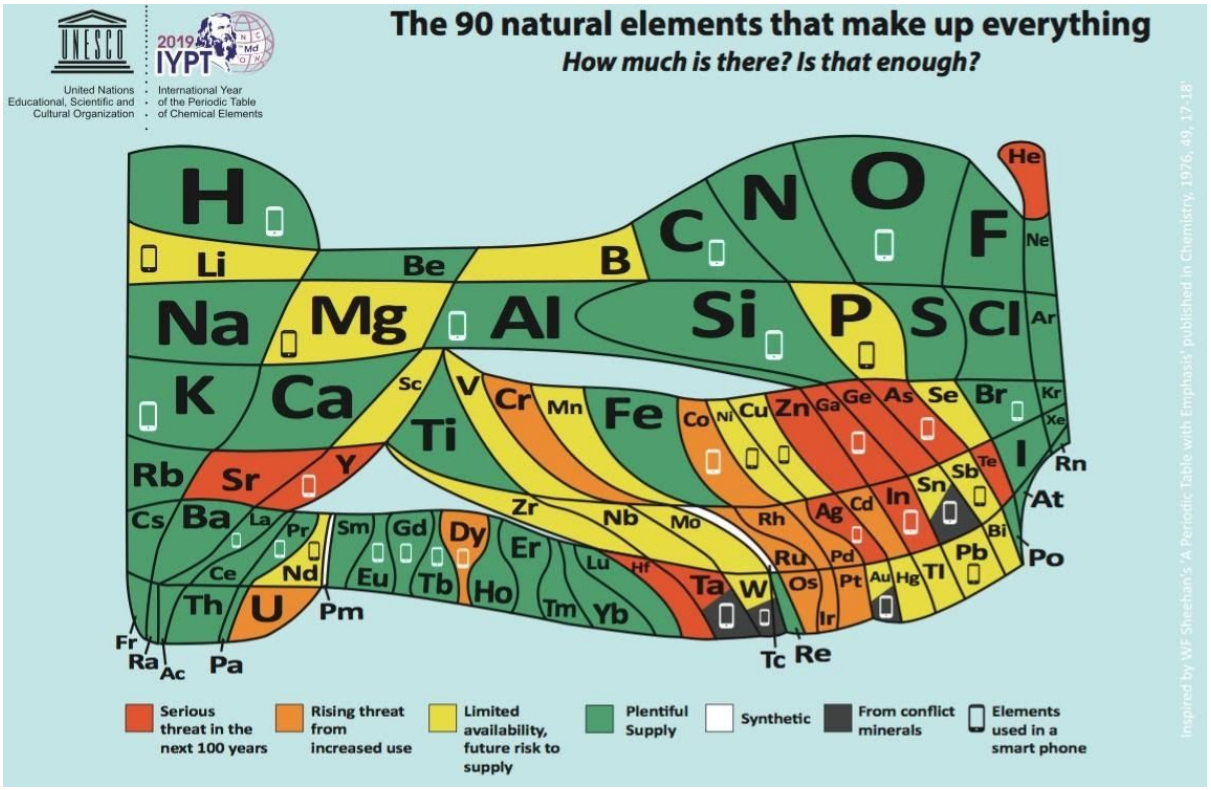
Elementary, My Dear Watson



https://www.euchems.eu/euchems-periodic-table/

This unique Periodic Table depicts various elements that will become increasingly scarce. Around 30 of these elements are used in your regular *smartphones* – and over half of these may give cause for concern in the years to come because of increasing scarcity. The issue of element scarcity cannot be stressed enough. With some 10 million smartphones being discarded or replaced every month in the European Union alone, we need to carefully look at our tendencies to waste and improperly recycle such items. Unless solutions are provided, we risk seeing many of the natural elements that make up the world around us run out – whether because of limited supplies, their location in conflict areas, or our incapacity to fully recycle them.

2019 has been the International Year of the Periodic Table (IYPT2019), and EuChemS, the European Chemical Society, hopes that this unique and thought-provoking Periodic Table will lead to reflection and ultimately, action.

Question 1: How can we protect endangered elements?

Question 2: Element *Au* is sourced largely from conflict zones. What is this element? What are its properties?

Question 3: Which of the following inference(s) are correct?

A. The elements with lower atomic numbers are more abundant
B. The elements with higher atomic numbers are more abundant

C. Oxygen, Silicon, Aluminum and Iron are few of the most common elements in the Earth's crust

Alien Invasion

Hydrilla is a submerged perennial root found in freshwater lakes. It is a native of the Indian subcontinent. It was carried by some enthusiasts to the USA around the years 1950s and sold there as an aquarium grass. Currently, many states of the US are struggling to contain this **invasive** plant which is causing immense ecological and economic damage.

Imagine a lake ecosystem that has dense Hydrilla growing. Along with this plant, you will find other native species of water plants that grow at different depths of water, fishes, frog, tadpole larvae, water snakes and crabs. The water of this pond is used in nearby farms for irrigation and is drawn out by pumps and channels.

Question 4: What is the probable impact of the profuse growth of Hydrilla on the lake ecosystem?

Question 5: What special feature of Hydrilla makes it an invasive species of plant for the American continent?

Key for Scoring and Interpretation

Questions 1 to 3- Classification:

Context: Social
Area: Physical Systems
Competencies: Identify scientifically oriented issues, explaining scientific phenomenon, deductive reasoning

Answer 1:

Protecting endangered elements needs to be achieved on a number of levels.

- Individual consumers need to question whether to upgrade phones and other electronic devices.
- Recycle correctly to avoid old electronics don't end up in landfill sites or polluting the environment.
- Create greater public awareness for recognizing the risk element `scarcity poses, support better recycling practices and an efficient circular economy.
- Moreover, transparency and ethical issues need to be considered to avoid the abuse of human rights, as well as to allow citizens to make informed choices when purchasing smartphones or other electronics – as many of the elements we require in our electronics are imported from conflict zones.

Answer 2: *Au* is Gold or Aurum.

Atomic number = 79. Gold is dense yellow lustrous metal. A good conductor of heat and electricity. It is malleable and ductile. It is used in jewelry, as bullion, and in electronics.

Answer 3: Inferences A and C are correct

Questions 4 and 5- Classification:

Context: Global
Area: Environment
Competencies: Identify scientifically oriented issues, explaining scientific phenomenon, deductive reasoning

Answer 4:

Profuse growth of Hydrilla will have an impact on the lake ecosystem.

As the hydrilla growth becomes dense, the fish and other native species become dominated and are phased out. It thus creates a *monoculture,* that is, the ecosystem becomes dominated

with only one species- hydrilla, as opposed to an ecosystem that has species of plants and animals.

It gives of CO_2 and uses lots of O_2. This changes the water quality with respect to the dissolved oxygen and the water pH. The available oxygen level becomes dangerously low for the native species. There is an increase in algae blooms, mosquito infestation due to dense matting (hydrilla) and decreased water flow.

Economic damage may also occur as it blocks drainage and irrigation channels.

Answer 5:

Hydrilla spreads rapidly through tubers and turions. Also, it does not have any native predator in the American subcontinent that checks its growth. It can also thrive in very low light conditions and thus, it manages to outgrow other species.