

THE PERIODIC TABLE AT 150: METALS, HEALTH AND MEDICINAL APPLICATIONS

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Elements of the Periodic Table have been known since ancient times, even before elements were known and recognized as such. No doubt Gold, Silver and Copper were the first of such metals, and were generally used in jewelry and coins, and in some cases also as weapons (Cu). By the time the Periodic System was tabulated in 1869, one was already aware that some elements and metal-containing compounds were needed for life (like Fe) and others were known to be very toxic, like As, Hg.

Already in the ancient times, some of the elements were used to treat diseases, like colloidal gold. The dosage of many of such metallic elements to humans, to cure or prevent diseases has been a subject of study for many decades. In the last 50 years the usage of metal compounds to diagnose or cure diseases has been rapidly grown.¹ The Periodic Table shown below, has elements that are known to play a role in health of humans bold printed.

Elements needed for live and used in curing and diagnosis

| | | | | | | | | | | | | | | | | | |
|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| H | | | | | | | | | | | | | | | | | He |
| Li | Be | | | | | | | | | | | B | C | N | O | F | Ne |
| Na | Mg | | | | | | | | | | | Al | Si | P | S | Cl | Ar |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe |
| Cs | Ba | Ln | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
| Fr | Ra | An | Rf | Db | Sg | Bh | Hs | Mt | Ds | Rg | Cn | Nh | Fl | Mc | Lv | Ts | Og |
| | | | | | | | | | | | | | | | | | |
| Lanthe noids: | | La | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | |
| Actin oids: | | Ac | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr | |

In the lecture examples of drugs to cure diseases will be presented, with a focus on treatment of cancers by metal compounds, in particular by certain platinum compounds.^{2,3} The mechanism of action of such compounds will be discussed as well.

References

1. Barry N.P.E.; Sadler, P.J. Chem. Commun., 2013, 49, 5106.
2. Reedijk, J. Inorg. Chim. Acta, 2016, 452, 268.
3. Casini A.; Reedijk J. Chem. Sci., 2012, 3, 3135