



## 8 PHOSPHATES, ARSENIATES AND VANADATES

This class groups around 350 often rare species. The structural units (anionic) are  $(XO_4)^{---}$ : X being P (phosphates), As (arsenates), V (vanadates).

Most phosphorus is found in nature in the form of apatite. Arsenic from sulphides or arsenides (from metal deposits) gives arsenates in oxidation zones.

<b>Apatite</b>	$Ca_5(PO_4)_3(F,Cl,OH)$	Hexa.
<b>Vivianite</b>	$Fe_3(PO_4)_2 \cdot 8H_2O$	Mono.
<b>Pyromorphite</b>	$Pb_5Cl(PO_4)_3$	Hexa.
<b>Turquoise</b>	$CuAl_6(OH)_8(PO_4)_4 \cdot 4H_2O$	Tric.
<b>Wavellite</b>	$Al_3(OH)_3(PO_4)_2 \cdot 5H_2O$	Ortho.
<b>Mimérite</b>	$Pb_5(AsO_4)_3Cl$	Hexa.
<b>Vanadinite</b>	$(Pb_3Cl)(VO_4)_3$	Hexa.

Phosphorite is a variety of poorly crystallized, microcrystalline, more or less amorphous apatite, which forms sedimentary phosphate deposits (e.g. deposits in the Gafsa-Métlaoui region).

**APATITE**                       $Ca_5(PO_4)_3(F,Cl,OH)$                       **Hexagonal**

Hexagonal prisms elongated along the c axis. Laminar, grainy or concretionary masses.

$D = 3.2 / H = 5$ . Difficult cleavages. Conchoidal breakage. transparent to translucent, most commonly green to blue, but can also be colorless, yellow, violet, pink or brown. Deposit: Very widespread mineral: in eruptive rocks and crystalline schists, in dispersed crystals; in pegmatites.





## PYROMORPHITE



Hexagonal

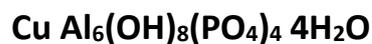
Hexagonal prismatic crystals shaped like barrels or needles. Fibrous or concretionary masses.

D = 7 / H = 3.5 to 4. Uneven breakage. Fragile. Translucent. Resinous to oily shine. Usually bright yellowish green or brown; more rarely gray or colorless.



Mineral of secondary origin, common in the oxidation zone of lead deposits, associated with cerussite, limonite, chalcedony, sometimes anglesite, smithsonite, hemimorphite.

## TURQUOISE



triclinic

Its name comes from “Turkish stone”, because it was in Turkey that Europeans found it (even though the mineral was imported from Iran, where it is called “Firouzé”). It was she who gave its name to the color turquoise blue.

Turquoise is a variety of alumina phosphate easily recognizable by its blue and sometimes greenish color. Many deposits are exhausted.

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