

# Phosphorus Molecule Cheatsheet (main biologically relevant)

Molecule	Bonds (central P)	Lone pairs	Ox. number	Formal charge	Overall charge	How charge arises	Comments
<b>H<sub>3</sub>PO<sub>4</sub></b> (phosphoric acid)	4 P–O (1 double, 3 P–OH)	0	+5	0	0	–	Acid form, tetrahedral
<b>H<sub>2</sub>PO<sub>4</sub><sup>–</sup></b> (dihydrogen phosphate)	4 P–O (~resonance)	0	+5	+1	–1	Proton loss → –1	Main buffer form
<b>PO<sub>4</sub><sup>3–</sup></b> (phosphate)	4 P–O (~resonance)	0	+5	+1	–3	3 proton losses → –3	Backbone of nucleic acids