1.7: Arithmetic crystal class

The **arithmetic crystal classes** are obtained in an elementary fashion by combining the geometric crystal classes and the corresponding types of Bravais lattices. For instance, in the monoclinic system, there are three geometric crystal classes, 2, *m* and 2/*m*, and two types of Bravais lattices, *P* and *C*. There are therefore six monoclinic arithmetic crystal classes. Their symbols are obtained by juxtaposing the symbol of the geometric class and that of the Bravais lattice, in that order: 2*P*, 2*C*, *mP*, *mC*, 2/*mP*, 2/*mC* (note that in the space group symbol the order is inversed: *P*2, *C*2, etc...). In some cases, the centering vectors of the Bravais lattice and some symmetry elements of the crystal class may or may not be parallel; for instance, in the geometric crystal class *mm* with the Bravais lattice *C*, the centering vector and the two-fold axis may be perpendicular or coplanar, giving rise to two different arithmetic crystal classes, *mm*2*C* and 2*mmC* (or *mm*2*A*, since it is usual to orient the two-fold axis parallel to *c*), respectively. There are 13 two-dimensional arithmetic crystal classes and 73 three-dimensional arithmetic crystal classes that are listed in the attached **table**. Space groups belonging to the same geometric crystal class and with the same type of Bravais lattice belong to the same arithmetic crystal class; these are therefore in one to one correspondence with the symmorphic space groups.

The group-theoretical definition of the arithmetic crystal classes is given in Section 8.2.3 of *International Tables of Crystallography, Volume A.*