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MULTIPLICATION OF SIMPLIFIED MATRIX SYMBOLS

PART II

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Abstract. Simplified matrix symbols of symmetry operations coexisting with a 4-fold axis can be easily multiplied using a multiplication table contained in the paper.

INTRODUCTION

Simplified matrix symbols introduced in foregoing papers describe the crystallographic point symmetry operations better than corresponding matrices, cannot be however directly multiplied. To avoid the necessity of transforming simplified matrix symbols into matrices and of returning to simplified symbols after multiplication, two ready multiplication tables have been derived. One comprising symmetry operations coexisting with a 6-fold axis has been already published in the foregoing paper (Nedoma *et al.*, 1979), the other valid for symmetry operations coexisting with a 4-fold axis is presented in this paper.

CONSTRUCTION OF THE MULTIPLICATION TABLE

Symmetry operations coexisting with a 4-fold axis (for allowed E-values) have been described with matrices and with simplified matrix symbols (Nedoma, Bolek, 1979). All multiplications have been performed on matrices. The resulting matrices have been translated into simplified symbols and introduced in the Table.

Matrix product of two simplified matrix symbols can be thus directly read in the table in the notation of simplified symbols.

The main advantage of the table consists in the fact that it contains only coex-

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isting symmetry operations. Performing matrix multiplication as usually on matrices one should always controll whether the two multiplied operations coexist with each other. The matrix multiplication can be namely mathematically always performed but in cases of not allowed E – values the resulting matrix has no crystallographic meaning.

Using the multiplication tables one must not controll the compatibility of multiplied operations as the tables contain only coexisting operations.

Basing on the general equation

$$n_1(M_1N_1P_1)\times \bar{n}_2(M_2N_2P_2) = n_1(M_1N_1P_1)\times n_2(M_2N_2P_2)\times \bar{1}(MNP)$$

one can multiply not only operations contained directly in the table but also operations of the type $n_1\times\bar{n}_2$ or $\bar{n}_1\times\bar{n}_2$ remembering that $D_1D_2 = D_3$ i.e. that after having multiplied the symbols of normal axes $D = 1$, the resulting matrix (read in the table) must be written as a normal or as an inversion axis in dependence on the sign of D_3.

REFERENCES

NEDOMA J., BOLEK A., 1978: Coexistence of symmetry elements in terms of abbreviated matrix symbols. Part II. *Miner. Polon.* 9, 1 (1978), 51–55.

NEDOMA J., DYCZEK J., BOLEK A., 1979: Multiplication of simplified matrix symbols. Part I. *Miner. Polon.* 9, 2 (1979).

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MNOŻENIE UPROSZCZONYCH SYMBOLI MACIERZOWYCH

CZĘŚĆ II

Streszczenie

Uproszczone symbole macierzowe operacji symetrii współistniejących z osią czterokrotną można mnożyć bezpośrednio za pomocą „tabliczki mnożenia" zamieszczonej w pracy.

Иозеф НЭДОМА, Ежи ДЫЧЕК, Павел ШРАЙНЕР

УМНОЖЕНИЕ СОКРАЩЕННЫХ МАТРИЧНЫХ СИМВОЛОВ ЧАСТЬ II

Резюме

Сокращенные матричные символы операций симметрии сосуществующих с 4-кратной осью можно умножать непосредственно при помощи таблицы умножения приведенной в статье.

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1(M N P)	4(1 0 0)	4($\bar{1}$ 0 0)	4(0 1 0)	4(0 $\bar{1}$ 0)	4(0 0 1)	4(0 0 $\bar{1}$)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 $\bar{1}$)	3(1
4(1 0 0)	2(1 0 0)	1(M N P)	3(1 1 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3(1 1 $\bar{1}$)	2(1 0 1)	4(0 0 $\bar{1}$)	2(1 1 0)	4(0
4($\bar{1}$ 0 0)	1(M N P)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	4(0 1 0)	2(1 1 0)	4(0 0 $\bar{1}$)	2(1
4(0 1 0)	3(1 1 $\bar{1}$)	3($\bar{1}$ 1 1)	2(0 1 0)	1(M N P)	3(1 1 1)	3($\bar{1}$ 1 $\bar{1}$)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 $\bar{1}$)	4(0
4(0 $\bar{1}$ 0)	3(1 $\bar{1}$ 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3(1 $\bar{1}$ $\bar{1}$)	4(0 0 1)	2(0 1 1)	4(1 0 0)	2(1
4(0 0 1)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ 1)	2(0 0 1)	1(M N P)	2(0 1 1)	4(0 $\bar{1}$ 0)	4(0 1 0)	2(0
4(0 0 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 0 1)	4(1 0 0)	2(1 0 1)	2(1 0 $\bar{1}$)	4($\bar{1}$
3(1 1 1)	2(1 1 0)	4(0 0 1)	2(0 1 1)	4(1 0 0)	2(1 0 1)	4(0 1 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 1 0)	3(1
3($\bar{1}$ $\bar{1}$ $\bar{1}$)	4(0 $\bar{1}$ 0)	2(1 0 1)	4(0 0 $\bar{1}$)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 1)	1(M N P)	3(1 1 1)	3(1 $\bar{1}$ $\bar{1}$)	2(1
3(1 1 $\bar{1}$)	2(1 0 $\bar{1}$)	4(0 1 0)	2(1 1 0)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 $\bar{1}$)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	1(M
3($\bar{1}$ $\bar{1}$ 1)	4(0 0 1)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	3($\bar{1}$ 1 1)	2(0 1 0)	1(M N P)	3(1
3(1 $\bar{1}$ 1)	2(1 0 1)	4(0 $\bar{1}$ 0)	4(0 0 1)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4(1 0 0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 1 1)	2(0
3($\bar{1}$ 1 $\bar{1}$)	4(0 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0 1 0)	2(1 0 1)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 0 1)	3($\bar{1}$
3($\bar{1}$ 1 1)	4(0 1 0)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	4(0 0 1)	2(0 1 1)	4($\bar{1}$ 0 0)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	2(0
3(1 $\bar{1}$ $\bar{1}$)	2(1 $\bar{1}$ 0)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 1)	4(0 $\bar{1}$ 0)	2(1 0 $\bar{1}$)	3(1 $\bar{1}$ 1)	2(0 0 1)	2(1 0 0)	3($\bar{1}$
2(1 0 0)	4($\bar{1}$ 0 0)	4(1 0 0)	2(1 0 1)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	2(1 1 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1
2(0 1 0)	2(0 1 $\bar{1}$)	2(0 1 1)	4(0 $\bar{1}$ 0)	4(0 1 0)	2(1 1 0)	2(1 $\bar{1}$ 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ 1)	3(1
2(0 0 1)	2(0 1 1)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	2(1 0 1)	4(0 0 $\bar{1}$)	4(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3($\bar{1}$
2(1 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 1 0)	4($\bar{1}$ 0 0)	4(0 1 0)	4(0 $\bar{1}$ 0)	4(1
2(1 $\bar{1}$ 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	2(0 1 0)	2(1 0 0)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	2(1 0 1)	2(0
2(1 0 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	2(0 0 1)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 1)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 1)	2(1
2(1 0 $\bar{1}$)	3($\bar{1}$ 1 1)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0
2(0 1 1)	2(0 1 0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 1)	4(0 $\bar{1}$ 0)	4(0 0 1)	2(1 $\bar{1}$ 0)	2(1
2(0 1 $\bar{1}$)	2(0 0 1)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ 1)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	4(0 0 1)	4(0

introduced in 1971 (La Belle, 1971, Chalmers et al., 1972, Ciszek, 1972), or its modified version CAST (Ciszek, Schwuttke, 1975). Basing on the assumptions

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Multiplication Table

0)	4($\bar{1}$ 0 0)	4(0 1 0)	4(0 $\bar{1}$ 0)	4(0 0 1)	4(0 0 $\bar{1}$)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ 1)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ $\bar{1}$)	2(1 0 0)	2(0 1 0)	2(0 0 1)	2(1 1 0)	2(1 $\bar{1}$ 0)	2(1 0 1)	2(1 0 $\bar{1}$)	2(0 1 1)	2(0 1 $\bar{1}$)
0)	1(M N P)	3(1 1 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3(1 1 $\bar{1}$)	2(1 0 1)	4(0 0 $\bar{1}$)	2(1 1 0)	4(0 $\bar{1}$ 0)	2(1 $\bar{1}$ 0)	4(0 1 0)	4(0 0 1)	2(1 0 $\bar{1}$)	4($\bar{1}$ 0 0)	2(0 1 1)	2(0 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 1)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	2(0 0 1)	2(0 1 0)
P)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	4(0 1 0)	2(1 1 0)	4(0 0 $\bar{1}$)	2(1 0 $\bar{1}$)	4(0 0 1)	2(1 0 1)	2(1 $\bar{1}$ 0)	4(0 $\bar{1}$ 0)	4(1 0 0)	2(0 1 $\bar{1}$)	2(0 1 1)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ 1)	3(1 1 1)	3(1 $\bar{1}$ $\bar{1}$)	2(0 1 0)	2(0 0 1)
$\bar{1}$)	3($\bar{1}$ 1 1)	2(0 1 0)	1(M N P)	3(1 1 1)	3($\bar{1}$ 1 $\bar{1}$)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 $\bar{1}$)	4(0 0 1)	4(1 0 0)	2(1 $\bar{1}$ 0)	2(0 1 1)	4(0 0 $\bar{1}$)	2(1 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	2(1 0 1)	3($\bar{1}$ $\bar{1}$ 1)	3(1 $\bar{1}$ $\bar{1}$)	2(1 0 0)	2(0 0 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)
1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3(1 $\bar{1}$ $\bar{1}$)	4(0 0 1)	2(0 1 1)	4(1 0 0)	2(1 1 0)	2(0 1 $\bar{1}$)	4(0 0 $\bar{1}$)	4($\bar{1}$ 0 0)	2(1 $\bar{1}$ 0)	2(1 0 1)	4(0 1 0)	2(1 0 $\bar{1}$)	3(1 1 1)	3($\bar{1}$ 1 $\bar{1}$)	2(0 0 1)	2(1 0 0)	3($\bar{1}$ 1 1)	3(1 1 $\bar{1}$)
1)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ 1)	2(0 0 1)	1(M N P)	2(0 1 1)	4(0 $\bar{1}$ 0)	4(0 1 0)	2(0 1 $\bar{1}$)	2(1 0 1)	4($\bar{1}$ 0 0)	2(1 0 $\bar{1}$)	4(1 0 0)	2(1 1 0)	2(1 $\bar{1}$ 0)	4(0 0 $\bar{1}$)	2(0 1 0)	2(1 0 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 $\bar{1}$)
$\bar{1}$)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 0 1)	4(1 0 0)	2(1 0 1)	2(1 0 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4(0 1 0)	2(0 1 1)	2(1 $\bar{1}$ 0)	2(1 1 0)	4(0 0 1)	2(1 0 0)	2(0 1 0)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ 1)
0)	4(0 0 1)	2(0 1 1)	4(1 0 0)	2(1 0 1)	4(0 1 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	1(M N P)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	2(1 0 0)	3($\bar{1}$ 1 1)	2(0 0 1)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 $\bar{1}$)	4(0 $\bar{1}$ 0)	2(1 0 $\bar{1}$)	4($\bar{1}$ 0 0)	2(0 1 $\bar{1}$)	4(0 0 $\bar{1}$)	2(1 $\bar{1}$ 0)
0)	2(1 0 1)	4(0 0 $\bar{1}$)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 1)	1(M N P)	3(1 1 1)	3(1 $\bar{1}$ $\bar{1}$)	2(1 0 0)	3($\bar{1}$ $\bar{1}$ 1)	2(0 0 1)	3($\bar{1}$ 1 $\bar{1}$)	2(0 1 0)	3(1 $\bar{1}$ 1)	3(1 1 $\bar{1}$)	3($\bar{1}$ 1 1)	4(1 0 0)	2(0 1 $\bar{1}$)	4(0 0 1)	2(1 $\bar{1}$ 0)	4(0 1 0)	2(1 0 $\bar{1}$)
$\bar{1}$)	4(0 1 0)	2(1 1 0)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 $\bar{1}$)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	1(M N P)	3(1 $\bar{1}$ $\bar{1}$)	2(0 1 0)	3(1 1 1)	2(0 0 1)	3($\bar{1}$ 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	4($\bar{1}$ 0 0)	2(0 1 1)	2(1 $\bar{1}$ 0)	4(0 0 1)	2(1 0 1)	4(0 $\bar{1}$ 0)
1)	2(1 1 0)	4($\bar{1}$ 0 0)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	3($\bar{1}$ 1 1)	2(0 1 0)	1(M N P)	3(1 1 $\bar{1}$)	2(0 0 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	2(1 0 0)	3(1 $\bar{1}$ 1)	3(1 1 1)	3($\bar{1}$ 1 $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	4(0 1 0)	2(1 0 1)	2(0 1 1)	4(1 0 0)	2(1 $\bar{1}$ 0)	4(0 0 $\bar{1}$)
1)	4(0 $\bar{1}$ 0)	4(0 0 1)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4(1 0 0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 1 1)	2(0 1 0)	3($\bar{1}$ 1 $\bar{1}$)	1(M N P)	3($\bar{1}$ $\bar{1}$ 1)	2(1 0 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 1)	3(1 1 $\bar{1}$)	2(0 1 1)	4($\bar{1}$ 0 0)	4(0 0 $\bar{1}$)	2(1 1 0)	2(1 0 $\bar{1}$)	4(0 1 0)
$\bar{1}$)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0 1 0)	2(1 0 1)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 0 1)	3($\bar{1}$ 1 1)	1(M N P)	3(1 $\bar{1}$ 1)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 1)	2(1 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	4(1 0 0)	2(0 1 1)	2(1 1 0)	4(0 0 1)
0)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	4(0 0 1)	2(0 1 1)	4($\bar{1}$ 0 0)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	2(0 0 1)	3(1 1 1)	2(1 0 0)	3(1 $\bar{1}$ $\bar{1}$)	1(M N P)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	2(0 1 $\bar{1}$)	4(1 0 0)	2(1 1 0)	4(0 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	2(1 0 1)
0)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 1)	4(0 $\bar{1}$ 0)	2(1 0 $\bar{1}$)	3(1 $\bar{1}$ 1)	2(0 0 1)	2(1 0 0)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	2(0 1 0)	3(1 1 $\bar{1}$)	1(M N P)	3($\bar{1}$ 1 1)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ 1)	2(1 0 $\bar{1}$)	4(0 1 0)	2(0 1 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0 0 1)	2(1 1 0)
0)	4(1 0 0)	2(1 0 1)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	2(1 1 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 1)	3(1 1 1)	3(1 $\bar{1}$ 1)	3($\bar{1}$ $\bar{1}$ 1)	1(M N P)	2(0 0 1)	2(0 1 0)	4(0 0 $\bar{1}$)	4(0 0 1)	4(0 1 0)	4(0 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	2(0 1 1)
$\bar{1}$)	2(0 1 1)	4(0 $\bar{1}$ 0)	4(0 1 0)	2(1 1 0)	2(1 $\bar{1}$ 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ 1)	3(1 1 1)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 $\bar{1}$)	2(0 0 1)	1(M N P)	2(1 0 0)	4(0 0 1)	4(0 0 $\bar{1}$)	2(1 0 $\bar{1}$)	2(1 0 1)	4($\bar{1}$ 0 0)	4(1 0 0)
1)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	2(1 0 1)	4(0 0 $\bar{1}$)	4(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	3($\bar{1}$ 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 $\bar{1}$)	3(1 1 1)	2(0 1 0)	2(1 0 0)	1(M N P)	2(1 $\bar{1}$ 0)	2(1 1 0)	4(0 $\bar{1}$ 0)	4(0 1 0)	4(1 0 0)	4($\bar{1}$ 0 0)
1)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 1 0)	4($\bar{1}$ 0 0)	4(0 1 0)	4(0 $\bar{1}$ 0)	4(1 0 0)	2(1 0 $\bar{1}$)	2(0 1 1)	2(1 0 1)	2(0 1 $\bar{1}$)	4(0 0 1)	4(0 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	1(M N P)	2(0 0 1)	3($\bar{1}$ 1 1)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)
$\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ 1)	3($\bar{1}$ 1 1)	2(0 1 0)	2(1 0 0)	2(0 1 $\bar{1}$)	2(1 0 $\bar{1}$)	2(1 0 1)	2(0 1 1)	4(0 1 0)	4(1 0 0)	4(0 $\bar{1}$ 0)	4($\bar{1}$ 0 0)	4(0 0 $\bar{1}$)	4(0 0 1)	2(1 1 0)	2(0 0 1)	1(M N P)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3(1 1 1)
$\bar{1}$)	3(1 $\bar{1}$ 1)	2(0 0 1)	2(1 0 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 1)	4(0 0 $\bar{1}$)	4(1 0 0)	2(0 1 1)	2(1 $\bar{1}$ 0)	4($\bar{1}$ 0 0)	4(0 0 1)	2(0 1 $\bar{1}$)	2(1 1 0)	4(0 $\bar{1}$ 0)	2(1 0 $\bar{1}$)	4(0 1 0)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	1(M N P)	2(0 1 0)	3(1 1 $\bar{1}$)	3($\bar{1}$ 1 1)
1)	3(1 1 $\bar{1}$)	2(1 0 0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	2(1 $\bar{1}$ 0)	2(0 1 $\bar{1}$)	4($\bar{1}$ 0 0)	4(0 0 $\bar{1}$)	2(0 1 1)	2(1 1 0)	4(1 0 0)	4(0 0 1)	4(0 1 0)	2(1 0 1)	4(0 $\bar{1}$ 0)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 1)	2(0 1 0)	1(M N P)	3(1 $\bar{1}$ 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)
0)	2(0 0 1)	3(1 $\bar{1}$ $\bar{1}$)	3(1 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3($\bar{1}$ 1 1)	4(0 $\bar{1}$ 0)	4(0 0 1)	2(1 $\bar{1}$ 0)	2(1 0 1)	2(1 1 0)	2(1 0 $\bar{1}$)	4(0 0 $\bar{1}$)	4(0 1 0)	2(0 1 $\bar{1}$)	4(1 0 0)	4($\bar{1}$ 0 0)	3(1 $\bar{1}$ 1)	3(1 1 $\bar{1}$)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	1(M N P)	2(1 0 0)
1)	2(0 1 0)	3($\bar{1}$ $\bar{1}$ 1)	3($\bar{1}$ 1 $\bar{1}$)	3(1 1 $\bar{1}$)	3(1 $\bar{1}$ 1)	2(1 0 $\bar{1}$)	2(1 $\bar{1}$ 0)	4(0 0 1)	4(0 1 0)	4(0 0 $\bar{1}$)	4(0 $\bar{1}$ 0)	2(1 1 0)	2(1 0 1)	2(0 1 1)	4($\bar{1}$ 0 0)	4(1 0 0)	3($\bar{1}$ 1 1)	3($\bar{1}$ $\bar{1}$ $\bar{1}$)	3(1 $\bar{1}$ $\bar{1}$)	3(1 1 1)	2(1 0 0)	1(M N P)