

# Character tables for exams.

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I am frequently asked what is in the Character Tables provided in the Part IA and Part IB exams. The tables printed for exams are a subset of the printed edition (Atkins Child and Philips, OUP, 1970). Unfortunately these have been out of print for many years, and are virtually unobtainable, however there is an on-line version available at the OUP web-site

<http://global.oup.com/uk/orc/chemistry/qchem2e/student/tables/>

The on-line tables contain a number of misprints. These are not present in either the printed edition or the edition printed for the examination schools. As far as I know there are no errors in either of the latter, and I have proof-read both.

## Character tables for examinations contain the following:

1. Table of contents on the inside cover.
2. All 12 Families of **character tables**, grouped in exactly the same way as in the print edition and the online edition, starting with  $C_1$  and ending with the linear groups and the full rotation group  $R_3$ .
3. All 11 sections from the **direct product tables**, exactly as in the print and online editions, including the General Rules and finishing with direct products in  $R_3$ .
4. **Descent in symmetry** and subgroup tables. This is not the complete set available in the print and online editions, but the two most useful tables are provided,
  - (i) descent in symmetry from  $O_h$ , including tetrahedral, tetragonal and trigonal distortions
  - (ii) descent in symmetry from  $R_3$  to  $O$ ,  $D_4$  and  $D_3$ .

## Character tables for examinations do not contain the following:

1. Extended rotation groups (double groups)
2. Further properties of the full rotation group
3. Descent in symmetry for groups other than  $O_h$  and  $R_3$ .
4. The notes and illustrations section of the book, which contains all the formulas and some useful examples.

## Misprints in the on-line tables

There are two versions of the on-line tables going around, in the older one there are more misprints, and some of them have been corrected in the more recent version.

You might like to correct any copy that you have printed. Most of them are for groups you are never likely to use. None of these errors is present in the printed edition (1970), or in the version provided for examinations.

### Character tables

1. In several character tables the degenerate pair  $(xz,yz)$  has been misprinted  $(xy,yz)$ , which is clearly incorrect because  $xy$  appears elsewhere. This happens in the following tables:  $C_6$ ,  $D_{3h}$ ,  $D_{5h}$ ,  $D_{5d}$ ,  $D_{6d}$ ,  $S_6$ ,  $S_8$ .
2. In  $C_{2h}$  the inversion symmetry is labelled  $I$  instead of  $i$ .
3. In  $C_{5h}$  the IR for the coordinate  $z$  is incorrectly assigned, it should be  $A''$ .
4. In  $C_{6h}$   $R_z$  has been omitted, it should transform as  $A_g$ .
5. In  $D_{6h}$   $(R_x,R_y)$  has been misprinted  $(R_x-R_y)$ .
6. In the characters of  $D_{4d}$  and  $D_{6d}$  some of the minus signs are at the wrong level.
7. In  $S_6$ , the characters of  $i$ , should all have a  $-$  sign in the IR  $E_u$ .
8. In  $S_8$ , I think  $(R_x,R_y)$  should be  $E_1$ , and not  $E_3$ .
9. In  $T$ , there should be a comma rather than a close bracket between the two quadratic forms.
10. In  $I_h$  the 5 quadratic forms in the IR  $H_g$  are all degenerate, whereas they have been incorrectly grouped 2 and 3. In addition the characters of  $12S_{10}$  and  $12S_{10}^3$  should have a  $-$  sign in the IRs  $T_{1u}$  and  $T_{2u}$ .

I didn't spot any misprints in the direct product tables or the descent of symmetry tables. If you know of any other errors in these tables please let me know. I will inform OUP and ask them to correct the online version.

NJBG 16/5/16