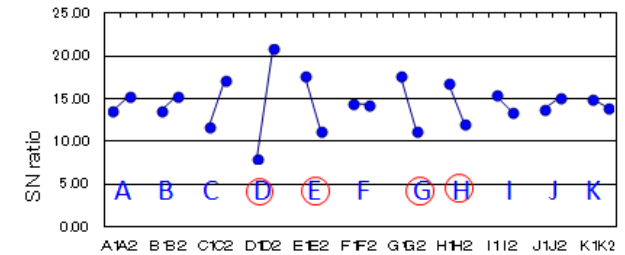


## treatment of missing data

[illegible]

## graph of the factorial effect I



① In the case the SN ratios on the 9th and 10th rows were not obtained, obtain and substitute the average value of the SN ratio excluding the 9th and 10th rows, and draw the graph of factorial effects 1.

② Regarding the 9th and 10th rows, control factors except the effective control factors D, E, G, and H are set at level 3 (average value of all SN ratios, this time 14.47), and the average value is calculated again.

| 9th row |      |               |       |         | 10th row |      |               |       |         |
|---------|------|---------------|-------|---------|----------|------|---------------|-------|---------|
| factor  | 1    | 2             | 3     | Average | factor   | 1    | 2             | 3     | Average |
| A       | 13.6 | 15.3          | 14.47 | 14.47   | A        | 13.6 | 15.3          | 14.47 | 14.47   |
| B       | 13.5 | 15.4          | 14.47 | 14.47   | B        | 13.5 | 15.4          | 14.47 | 14.47   |
| C       | 11.7 | 17.2          | 14.47 | 14.47   | C        | 11.7 | 17.2          | 14.47 | 14.47   |
| D       | 8.1  | 20.9          | 14.47 | 14.47   | D        | 8.1  | 20.9          | 14.47 | 14.47   |
| E       | 17.7 | 11.3          | 14.47 | 14.47   | E        | 17.7 | 11.3          | 14.47 | 14.47   |
| F       | 14.5 | 14.4          | 14.47 | 14.47   | F        | 14.5 | 14.4          | 14.47 | 14.47   |
| G       | 17.6 | 11.3          | 14.47 | 14.47   | G        | 17.6 | 11.3          | 14.47 | 14.47   |
| H       | 16.9 | 12.0          | 14.47 | 14.47   | H        | 16.9 | 12.0          | 14.47 | 14.47   |
| I       | 15.4 | 13.5          | 14.47 | 14.47   | I        | 15.4 | 13.5          | 14.47 | 14.47   |
| J       | 13.8 | 15.1          | 14.47 | 14.47   | J        | 13.8 | 15.1          | 14.47 | 14.47   |
| K       | 15.0 | 13.9          | 14.47 | 14.47   | K        | 15.0 | 13.9          | 14.47 | 14.47   |
|         |      | total average | 14.47 |         |          |      | total average | 14.47 |         |

calculate average  
14.83

calculate average  
14.22

Substitute **estimated value** into the 9th and 10th rows where there were missing data, and draw the **graph of factorial effects II**.

|        | control factor |   |   |   |   |   |   |   |         |   |   |       |               | 9th row |      |       |         |               |      | 10th row |       |         |  |  |  |
|--------|----------------|---|---|---|---|---|---|---|---------|---|---|-------|---------------|---------|------|-------|---------|---------------|------|----------|-------|---------|--|--|--|
| Ex.No. | A              | B | C | D | E | F | G | H | I       | J | K | SN比   | factor        | 1       | 2    | 3     | Average | factor        | 1    | 2        | 3     | Average |  |  |  |
| 1      | 1              | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1       | 1 | 1 | 13.28 | A             | 13.6    | 15.3 | 14.47 | 14.47   | A             | 13.6 | 15.3     | 14.47 | 14.47   |  |  |  |
| 2      | 1              | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2       | 2 | 2 | 0.26  | B             | 13.5    | 15.4 | 14.47 | 14.47   | B             | 13.5 | 15.4     | 14.47 | 14.47   |  |  |  |
| 3      | 1              | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2       | 2 | 2 | 23.48 | C             | 11.7    | 17.2 | 14.47 | 14.47   | C             | 11.7 | 17.2     | 14.47 | 14.47   |  |  |  |
| 4      | 1              | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1       | 1 | 2 | 9.31  | D             | 8.1     | 20.9 | 14.47 | 14.47   | D             | 8.1  | 20.9     | 14.47 | 14.47   |  |  |  |
| 5      | 1              | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1       | 2 | 1 | 10.47 | E             | 17.7    | 11.3 | 14.47 | 14.47   | E             | 17.7 | 11.3     | 14.47 | 14.47   |  |  |  |
| 6      | 1              | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2       | 1 | 1 | 25.01 | F             | 14.5    | 14.4 | 14.47 | 14.47   | F             | 14.5 | 14.4     | 14.47 | 14.47   |  |  |  |
| 7      | 2              | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1       | 2 | 1 | 23.29 | G             | 17.6    | 11.3 | 14.47 | 14.47   | G             | 17.6 | 11.3     | 14.47 | 14.47   |  |  |  |
| 8      | 2              | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1       | 1 | 2 | 6.50  | H             | 16.9    | 12.0 | 14.47 | 14.47   | H             | 16.9 | 12.0     | 14.47 | 14.47   |  |  |  |
| 9      | 3              | 3 | 3 | 2 | 2 | 3 | 1 | 2 | 3       | 3 | 3 | 14.83 | I             | 15.4    | 13.5 | 14.47 | 14.47   | I             | 15.4 | 13.5     | 14.47 | 14.47   |  |  |  |
| 10     | 3              | 3 | 3 | 1 | 1 | 3 | 1 | 2 | 3       | 3 | 3 | 14.22 | J             | 13.8    | 15.1 | 14.47 | 14.47   | J             | 13.8 | 15.1     | 14.47 | 14.47   |  |  |  |
| 11     | 2              | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1       | 2 | 2 | 29.64 | K             | 15.0    | 13.9 | 14.47 | 14.47   | K             | 15.0 | 13.9     | 14.47 | 14.47   |  |  |  |
| 12     | 2              | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 2       | 2 | 1 | 3.45  | total average |         |      |       | 14.47   | total average |      |          |       | 14.47   |  |  |  |
|        |                |   |   |   |   |   |   |   | Average |   |   | 14.48 |               |         |      |       |         |               |      |          |       |         |  |  |  |

**graph of the factorial effect II**

