

# DOE Full Factorial Design

This guide provides instructions on designing a full factorial experiment. A full factorial experiment in which every possible treatment combination will be studied. For analysis of full factorial experiments, see the **DOE Full Factorial Analysis** guide.

## Create the Design (Full Factorial Design)

1. Open the platform under **DOE > Classical > Full Factorial Design**.

2. Specify the **Response(s)**:

- Double-click on **Y**, under **Response Name**, to name the response.
- If needed, change the response **Goal** and **Upper** and **Lower Limits**.
- Click **Add Response** to add additional responses.

3. Specify the **Factors**:

- Click **Continuous** or **Categorical**, then the number of levels to add a factor. Click **Remove** to remove a factor.
- Double-click to change the factor name.
- Tab to change the values for the factor.
- Repeat for all factors.

4. Click **Continue**.

5. Specify the **Run Order** (default is Randomize), the **Number of Center Points** and the **Number of Replicates** (the number of additional sets of runs for each design point).

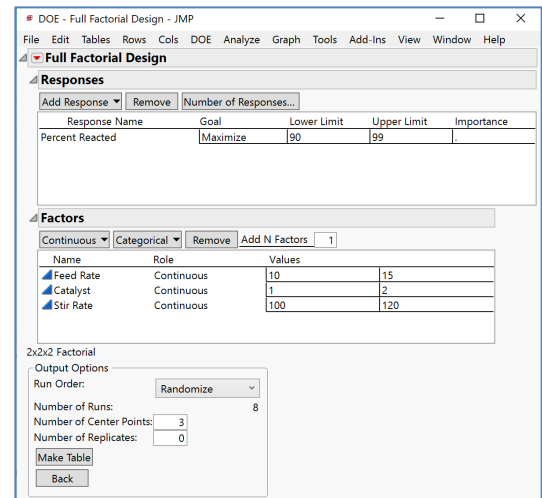
Here, we have specified an unreplicated fully randomized  $2^3$  full factorial design with 3 center points, totaling  $8 + 3 = 11$  runs.

6. Select **Make Table** to generate the design (or **Back** to make changes). In the design table:

- The **Pattern** column provides a key to the factor levels for each trial.
- The factor settings are indicated in the columns for each factor.
- The response for each trial will be recorded in the last column (here, **Percent Reacted**).
- The **Model** script will be saved to the data table and the design specification window stays open to change or regenerate the design.

Notes:

- Select **Evaluate Design** to view properties of the design.
- The **Easy DOE** platform (under DOE menu) provides a guided workflow to step through the process of creating and analyzing experiments and is an alternative to the steps above for creating a design.
- Full factorial designs can also be generated from the **Custom Design** platform.



Pattern	Feed Rate	Catalyst	Stir Rate	Percent Reacted
1 ---	10	2	100	
2 +-+	15	1	100	
3 000	12.5	1.5	110	
4 +++	15	2	120	
5 ---	10	1	100	
6 +-+	15	2	100	
7 +++	15	1	120	
8 000	12.5	1.5	110	
9 ---	10	1	120	
10 +-+	10	2	120	
11 000	12.5	1.5	110	

Visit **Design of Experiments Guide** in **JMP Help** to learn more.