

Factors predictive of pH in ABC Beverage products

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This report presents the findings of an analysis to determine the factors predictive of pH in ABC Beverage products. The analysis applies five predictive Machine Learning models to beverage manufacture process data for each of the four ABC Beverage products – Brand A, B, C and D – and selects one model based on predictive performance on resampled data. Twenty models were tested in total, and their error performance measured with the Root Mean Square Error (RMSE) metric. The results of the analysis are summarized below:

- The data has a substantial number of missing entries, pointing to possible gaps in data collection and management, and/or sensor malfunction and need for maintenance.
- **Random Forest** best predicts pH for all four ABC Beverage products. Model predictive error is as follows:
 - **brand A**, 0.11
 - **brand B**, 0.09
 - **brand C**, 0.14
 - **brand D**, 0.08
- Manufacturing process factors most predictive of pH are, in descending order of importance, as follows:
 - **brand A** *Mnf.Flow, Filler.Level, Usage.cont, Bowl.Setpoint*
 - **brand B**, *Mnf.Flow*
 - **brand C**, *Oxygen.Filler, Carb.Rel*
 - **brand D**, *Usage.cont, Mnf.Flow, Pressure.Vacuum, Carb.Pressure1, Temperature*

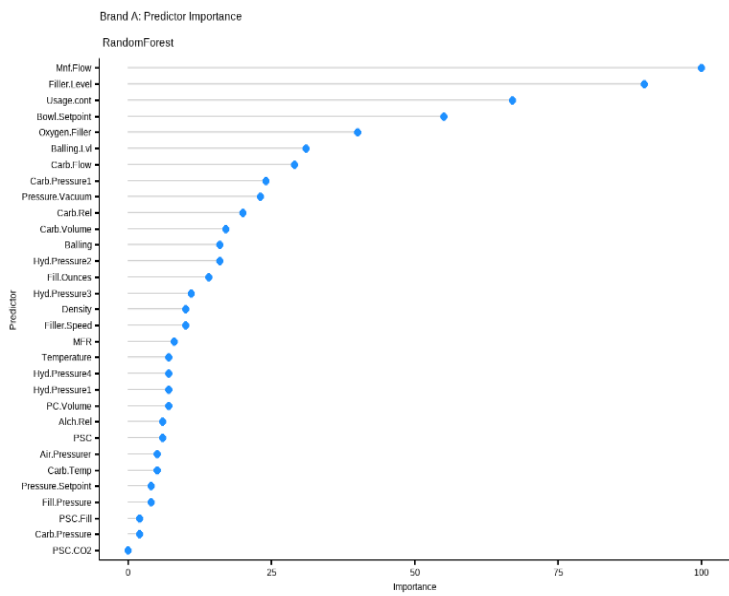
Full factor importance for each brand manufacturing process is provided in the following page.

A limitation of the analysis is that its estimates are based on resampled, cross-validated data, rather than on testing on unseen data. A next step is to test the models with unseen test data.

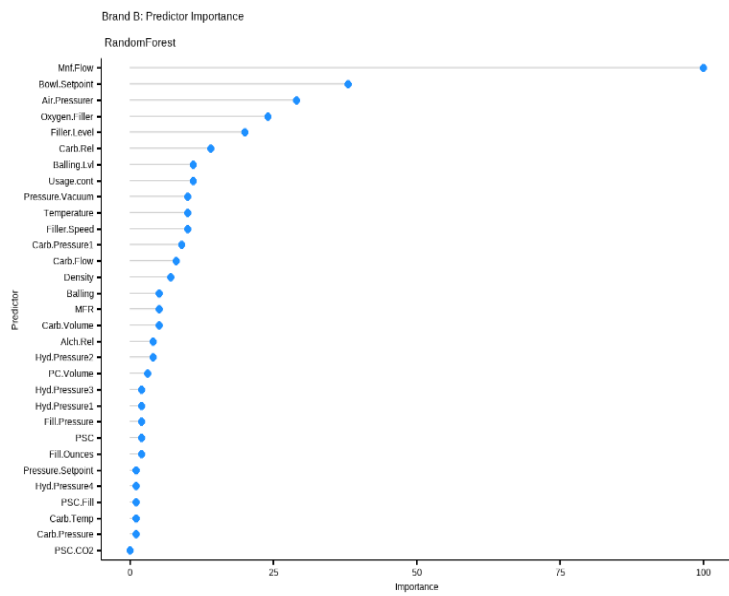
[Model predictions](#) for each product brand are available for inspection and download. Full details on the methodology of the analysis are found in the [Technical Report](#).

Manufacturing process factor importance on product pH

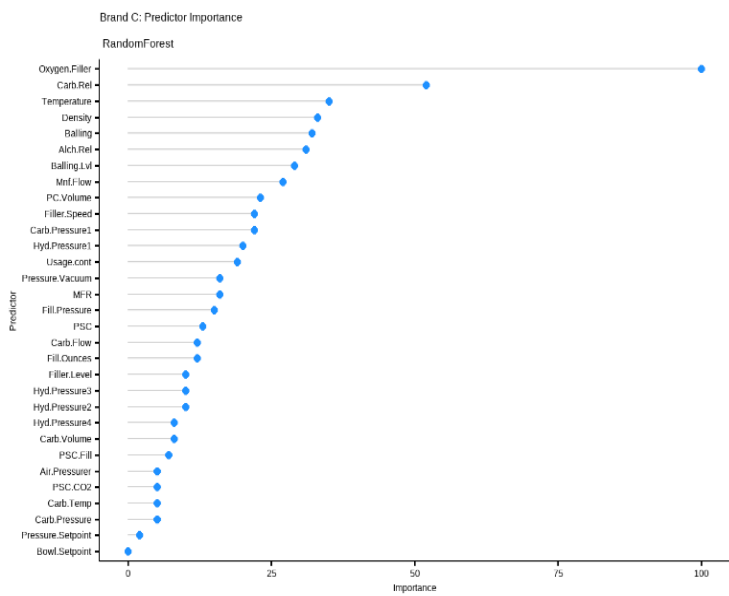
Brand A: predictor importance



Brand B: predictor importance



Brand C: predictor importance



Brand C: predictor importance

