import pandas as pd

from sklearn.model\_selection import train\_test\_split

from sklearn.ensemble import GradientBoostingRegressor

# Load the dataset

file\_path = r" "

data = pd.read\_csv(file\_path)

# Adjust column names to match the dataset

X = data[['Concentration', 'Temperature', 'Doping (mol%)']] # Feature columns

y = data['Response'] # Target column

# Split the data into training and testing sets

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2, random\_state=42)

# Initialize the Gradient Boosting Regressor model

model = GradientBoostingRegressor(random\_state=42)

# Train the model

model.fit(X\_train, y\_train)

# Define the conditions for prediction

predict\_conditions = pd.DataFrame({

'Concentration': [5] \* 32, # Concentration is fixed at 5

'Temperature': [150, 170, 190, 210, 230, 250, 270, 290] \* 4, # Different temperatures

'Doping (mol%)': [0] \* 8 + [3] \* 8 + [6] \* 8 + [9] \* 8 # Doping levels are 0, 3, 6, and 9

})

# Make predictions using the trained model

predictions = model.predict(predict\_conditions)

# Add the predictions to the DataFrame

predict\_conditions['Predicted Response'] = predictions

# Print the prediction results

print(predict\_conditions)