In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```
df=pd.read_csv('AirQualityodisha.csv')
df
```

Out[3]:

	Stn Code	Sampling Date	State	City	Location of Monitoring Station	Agency	Type of Location	SO2	NO2	RSPM/PM10	
0	68	02-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	11	24	143	1
1	68	06-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	10	23	133	
2	68	09-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	8	25	125	1
3	68	13-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	10	25	137	1
4	68	16-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	9	26	186	1
...	...	...	...	...	...	...	...	...	...	...	
2387	819	15-12-15	Odisha	Kalinga Nagar	Roof of RO OFFICE BUILDING	Odisha State Pollution Control Board	Industrial Area	2	10	92	
2388	819	17-12-15	Odisha	Kalinga Nagar	Roof of RO OFFICE BUILDING	Odisha State Pollution Control Board	Industrial Area	2	10	99	
2389	819	22-12-15	Odisha	Kalinga Nagar	Roof of RO OFFICE BUILDING	Odisha State Pollution Control Board	Industrial Area	2	10	90	
2390	819	26-12-15	Odisha	Kalinga Nagar	Roof of RO OFFICE BUILDING	Odisha State Pollution Control Board	Industrial Area	2	10	97	
2391	819	29-12-15	Odisha	Kalinga Nagar	Roof of RO OFFICE BUILDING	Odisha State Pollution	Industrial Area	2	10	98	

	Stn Code	Sampling Date	State	City	Location of Monitoring Station	Agency	Type of Location	SO2	NO2	RSPM/PM10
						Control Board				

2392 rows × 11 columns

----------DATA CLEANING----------

In [4]:
```
df.head()
```

Out[4]:

	Stn Code	Sampling Date	State	City	Location of Monitoring Station	Agency	Type of Location	SO2	NO2	RSPM/PM10	PM 2.5
0	68	02-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	11	24	143	102.0
1	68	06-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	10	23	133	96.0
2	68	09-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	8	25	125	116.0
3	68	13-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	10	25	137	107.0
4	68	16-01-15	Odisha	Talcher	T.T.P.S.Colony, Talcher	Odisha State Pollution Control Board	Industrial Area	9	26	186	118.0

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2392 entries, 0 to 2391
Data columns (total 11 columns):
 #   Column                          Non-Null Count  Dtype  
---  ------                          --------------  -----  
 0   Stn Code                        2392 non-null   int64  
 1   Sampling Date                   2392 non-null   object 
 2   State                           2392 non-null   object 
 3   City                            2392 non-null   object 
 4   Location of Monitoring Station  2392 non-null   object 
 5   Agency                          2392 non-null   object 
 6   Type of Location                2392 non-null   object 
 7   SO2                             2392 non-null   int64  
 8   NO2                             2392 non-null   int64  
 9   RSPM/PM10                       2392 non-null   int64  
 10  PM 2.5                          2060 non-null   float64
dtypes: float64(1), int64(4), object(6)
memory usage: 205.7+ KB
```

In [6]:
```
df.drop(['PM 2.5','RSPM/PM10'],axis = 1,inplace = True)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2392 entries, 0 to 2391
Data columns (total 9 columns):
 #   Column                          Non-Null Count  Dtype 
---  ------                          --------------  ----- 
 0   Stn Code                        2392 non-null   int64 
 1   Sampling Date                   2392 non-null   object
 2   State                           2392 non-null   object
 3   City                            2392 non-null   object
 4   Location of Monitoring Station  2392 non-null   object
 5   Agency                          2392 non-null   object
 6   Type of Location                2392 non-null   object
 7   SO2                             2392 non-null   int64 
 8   NO2                             2392 non-null   int64 
dtypes: int64(3), object(6)
memory usage: 168.3+ KB
```

In [7]:
```
df.drop('Agency', axis=1, inplace=True) #deleterd due to null value
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2392 entries, 0 to 2391
Data columns (total 8 columns):
 #   Column                          Non-Null Count  Dtype 
---  ------                          --------------  ----- 
 0   Stn Code                        2392 non-null   int64 
 1   Sampling Date                   2392 non-null   object
 2   State                           2392 non-null   object
 3   City                            2392 non-null   object
 4   Location of Monitoring Station  2392 non-null   object
 5   Type of Location                2392 non-null   object
 6   SO2                             2392 non-null   int64 
 7   NO2                             2392 non-null   int64 
dtypes: int64(3), object(5)
memory usage: 149.6+ KB
```

----------DATA INTEGRATION----------

In [8]:
```
sns.set_theme(style="whitegrid")
df.shape
```

Out[8]:
```
(2392, 8)
```

In [9]:
```
Q1 = df.quantile(0.25) #first 25% of the data
Q3 = df.quantile(0.75) #first 75% of the data
IQR = Q3 - Q1 #IQR = InterQuartile Range
scale = 2 #For Normal Distributions, scale = 1.5
lower_lim = Q1 - scale*IQR
upper_lim = Q3 + scale*IQR
lower_outliers = (df[df.columns[2:13]] < lower_lim)
upper_outliers = (df[df.columns[2:13]] > upper_lim)
```

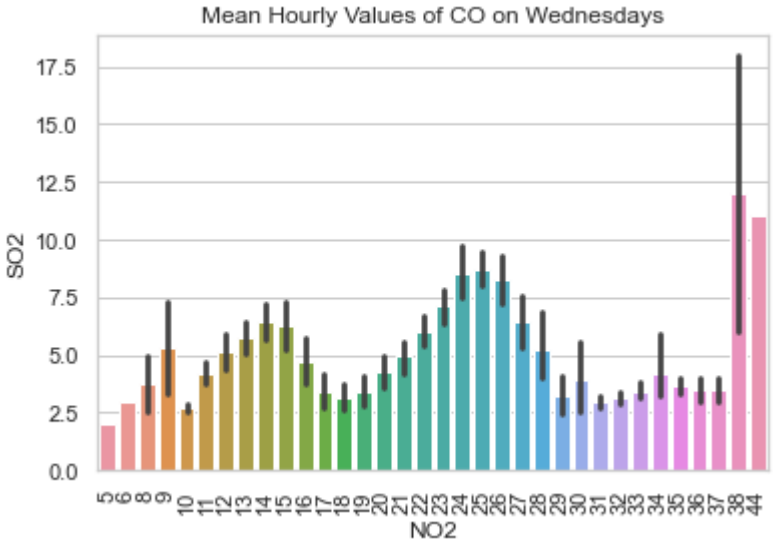
```
C:\Users\Sayuja\AppData\Local\Temp\ipykernel_1224\2189451147.py:7: FutureWarning: Aut
omatic reindexing on DataFrame vs Series comparisons is deprecated and will raise Val
ueError in a future version. Do `left, right = left.align(right, axis=1, copy=False)`
before e.g. `left == right`
  lower_outliers = (df[df.columns[2:13]] < lower_lim)
C:\Users\Sayuja\AppData\Local\Temp\ipykernel_1224\2189451147.py:8: FutureWarning: Aut
omatic reindexing on DataFrame vs Series comparisons is deprecated and will raise Val
ueError in a future version. Do `left, right = left.align(right, axis=1, copy=False)`
before e.g. `left == right`
  upper_outliers = (df[df.columns[2:13]] > upper_lim)
```

In [10]:
```
df[df.columns[2:13]][(lower_outliers | upper_outliers)].info()
```

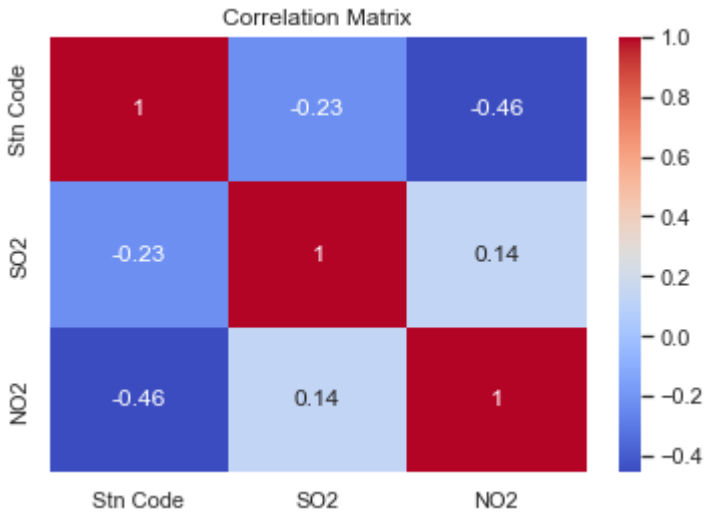
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2392 entries, 0 to 2391
Data columns (total 6 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   State                           0 non-null      object
 1   City                            0 non-null      object
 2   Location of Monitoring Station  0 non-null      object
 3   Type of Location                0 non-null      object
 4   SO2                             33 non-null     float64
 5   NO2                             0 non-null      float64
dtypes: float64(2), object(4)
memory usage: 112.2+ KB
```

----------DATA TRANSFORMATION----------

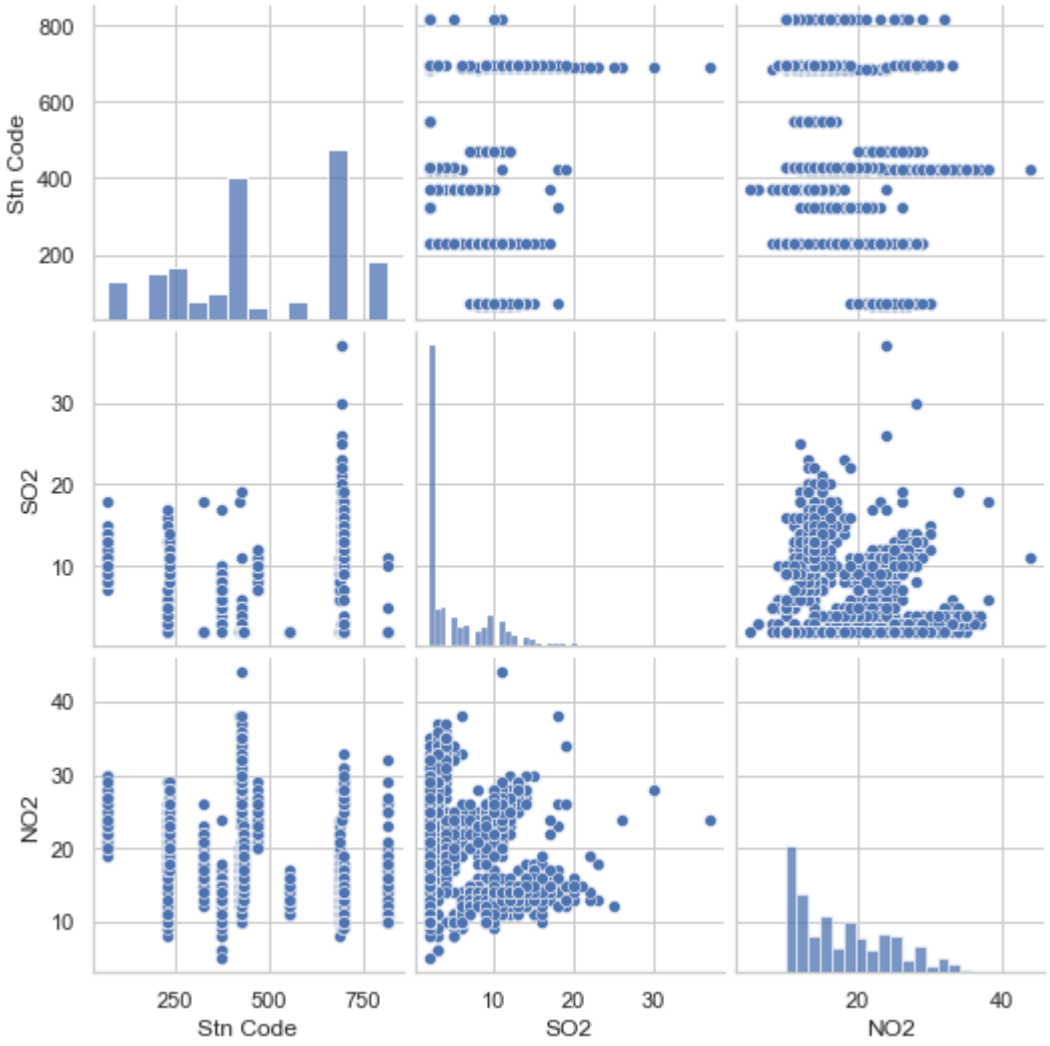
In [11]:
```
sns.barplot(x='NO2',y='SO2', data=df.sort_values('NO2'))
plt.title('Mean Hourly Values of CO on Wednesdays')
plt.xticks(rotation=90)
plt.show()
```



In [12]:
```
sns.heatmap(df.corr(),annot=True,cmap = 'coolwarm')
plt.title('Correlation Matrix')
plt.show()
```



In [13]:
```
sns.pairplot(df)
plt.show()
```



----------Model BULIDING----------

In [14]:
```
df.drop('Location of Monitoring Station', axis=1, inplace=True)
```

In [16]:
```
from sklearn.model_selection import train_test_split
Y = df['NO2'] #variável de predição
X = df.drop(['State','City'], axis=1)
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2)
print(X_train.shape, X_test.shape)
```

```
(1913, 5) (479, 5)
```

In [ ]: