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Department of Chemical Engineering

MCL732 ASSIGNMENT-3 REPORT

1.Aethalometer Model MATLAB code:

```
filename = 'F:\c data\desktop\Desktop\AYAAN MCL732 ASSIGNMENT-3\BC_aethalometer_AVGFinal.xlsx';
data = readtable(filename, 'PreserveVariableNames', true);

MAE_370 = 18.47;
MAE_880 = 7.77;

BC1 = data.BC1;
BC6 = data.BC6;

b_abs_370 = BC1 * MAE_370;
b_abs_880 = BC6 * MAE_880;

wavelength_ratio = (880/370);
AAE_bb = 1.8;

b_abs_880_ff = ((wavelength_ratio^AAE_bb * b_abs_880) - b_abs_370) /
(wavelength_ratio^AAE_bb - wavelength_ratio);
b_abs_880_bb = b_abs_880 - b_abs_880_ff;

BC6_ff = b_abs_880_ff / MAE_880;
BC6_bb = b_abs_880_bb / MAE_880;

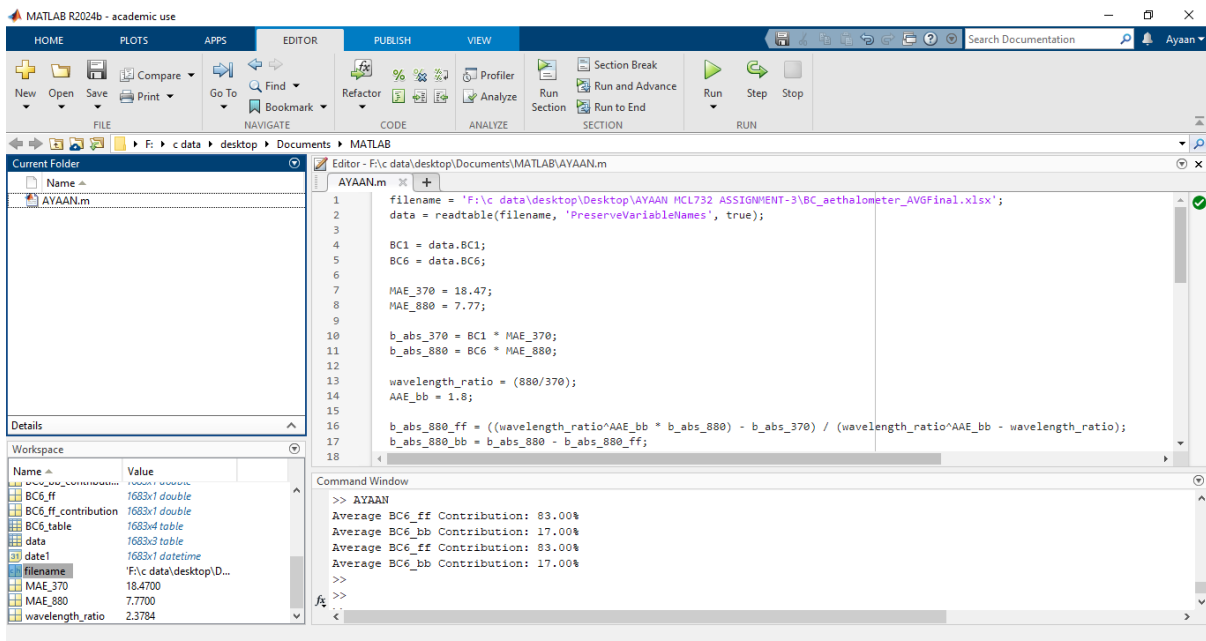
BC6_ff_contribution = (BC6_ff ./ BC6) * 100;
BC6_bb_contribution = (BC6_bb ./ BC6) * 100;

avg_BC6_ff = mean(BC6_ff_contribution, 'omitnan');
avg_BC6_bb = mean(BC6_bb_contribution, 'omitnan');

fprintf('Average BC6_ff Contribution: %.2f%%\n', avg_BC6_ff);
fprintf('Average BC6_bb Contribution: %.2f%%\n', avg_BC6_bb);

BC6_table = table(BC6_ff, BC6_bb, repmat(avg_BC6_ff, size(BC6_ff)),
repmat(avg_BC6_bb, size(BC6_bb)), 'VariableNames', {'BC6_ff', 'BC6_bb',
'Avg_BC6_ff', 'Avg_BC6_bb'});

writetable(BC6_table, filename, 'Sheet', 'BC6_Data');
```



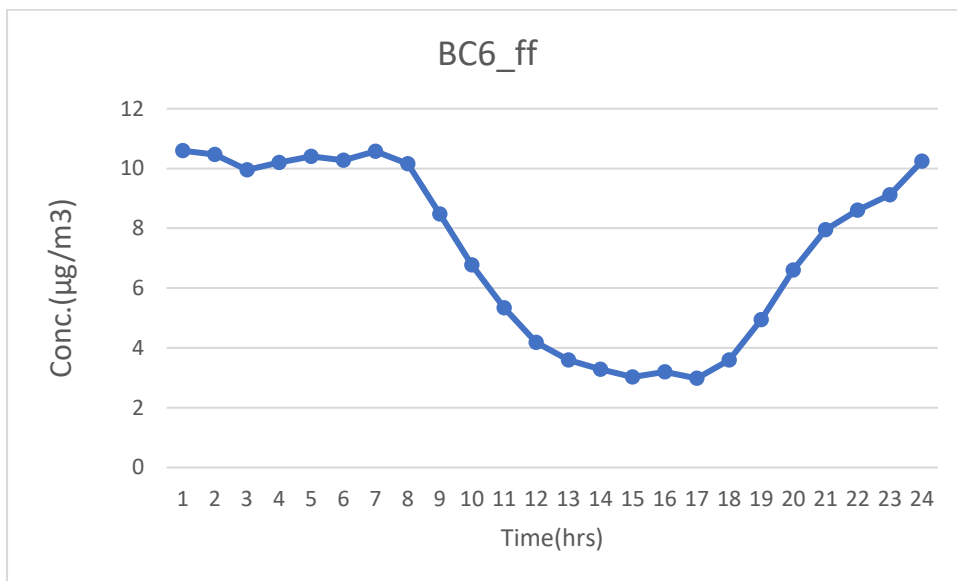
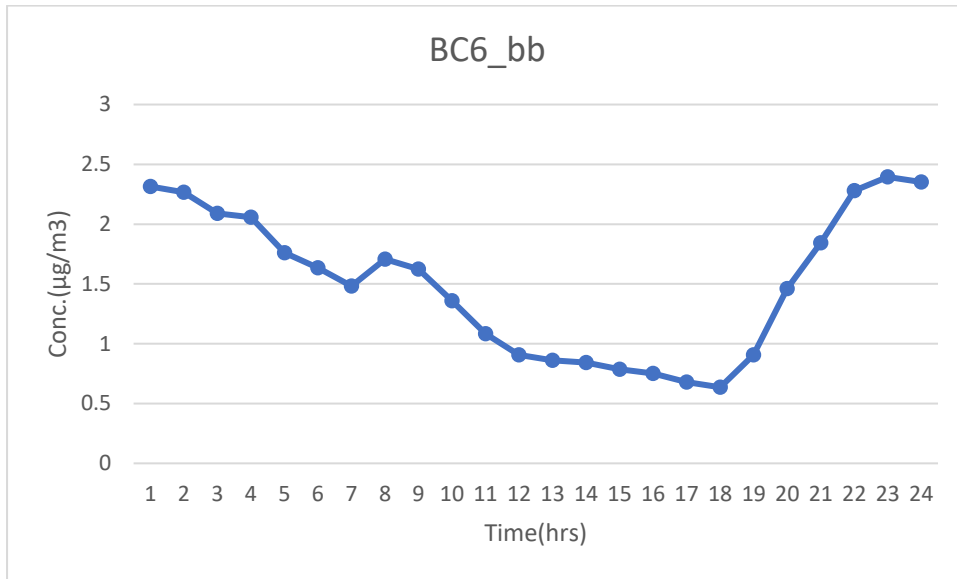
Computation of contributions of biomass burning(BCbb) and Fossil Fuel Burning(BCff) to total BC6.

Average BC6_ff Contribution: **83.00%**

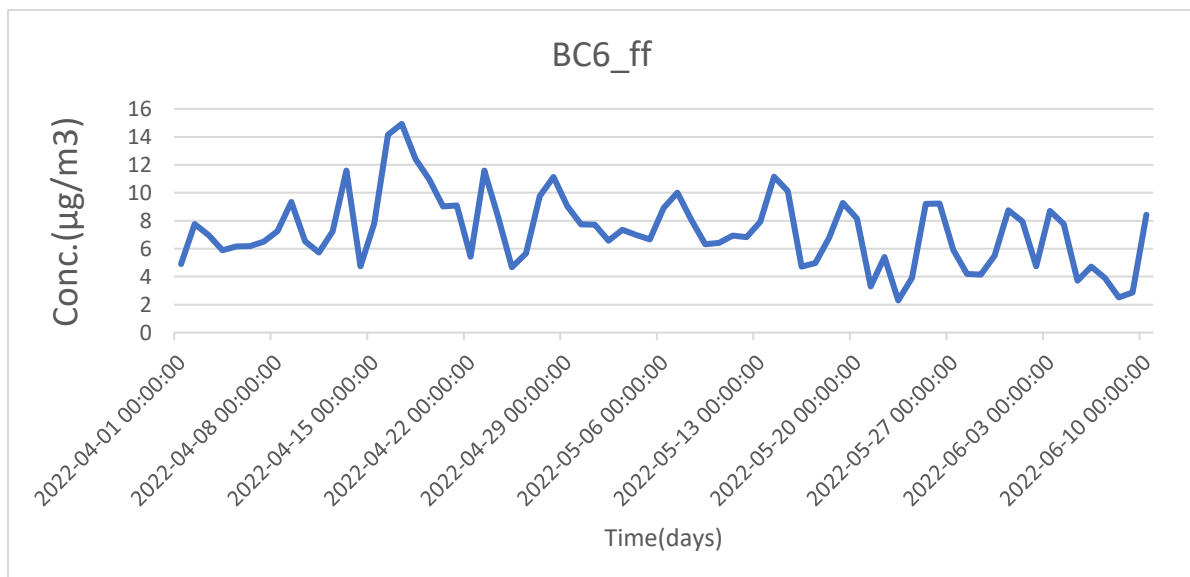
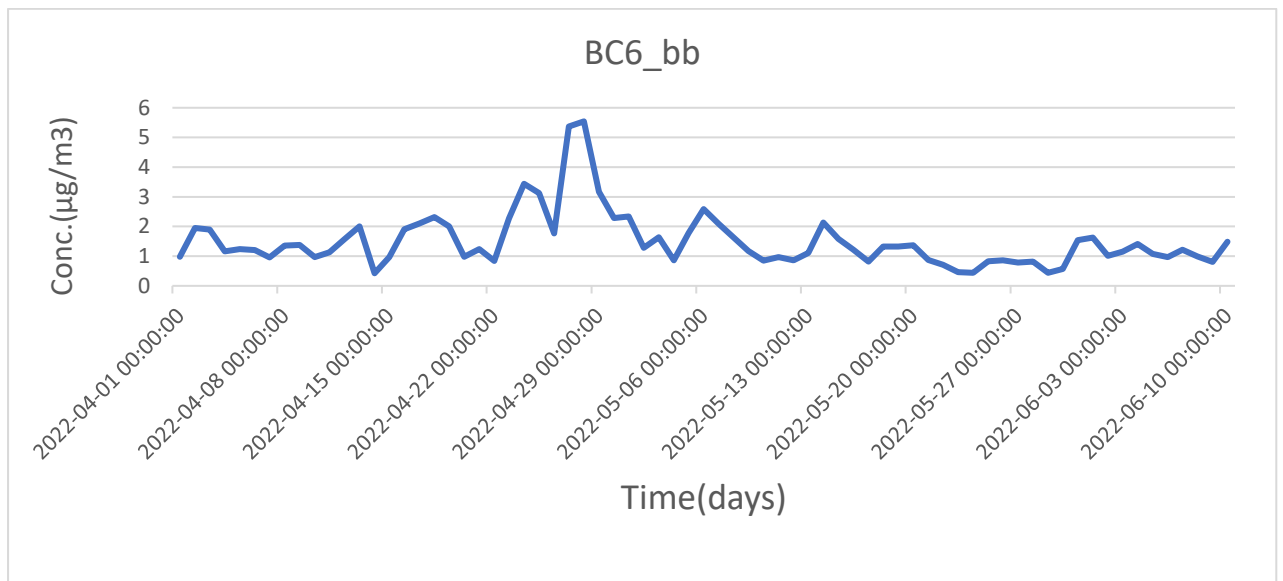
Average BC6_bb Contribution: **17.00%**

2.Diurnal and Daily variation of BC_{ff} and BC_{bb} based on Aethalometer model results:

2.1 Diurnal variation:



2.2 Daily variation:

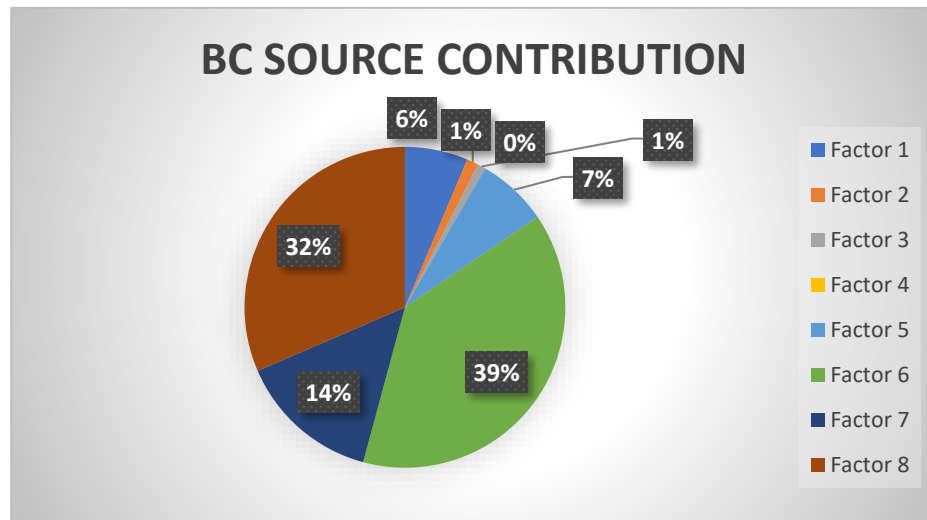


3).BC SOURCE APPORTIONMENT USING PMF MODEL:

Results:

From Conc. Excel file of Assignment-2:

PMF MODEL:



BC SOURCE DISTRIBUTION ACROSS IDENTIFIED PMF FACTORS:

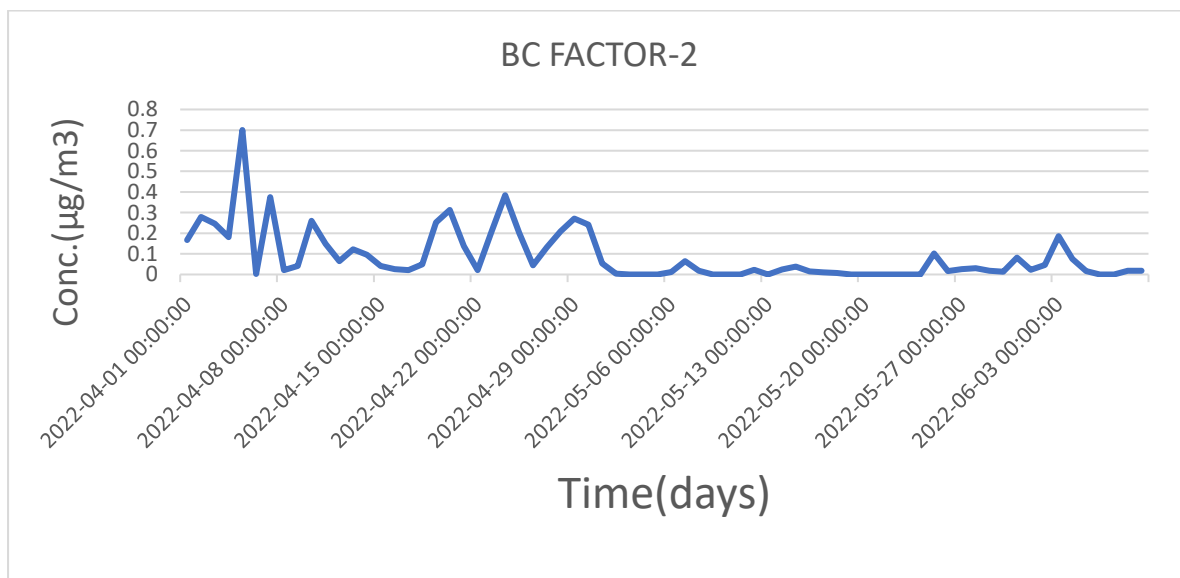
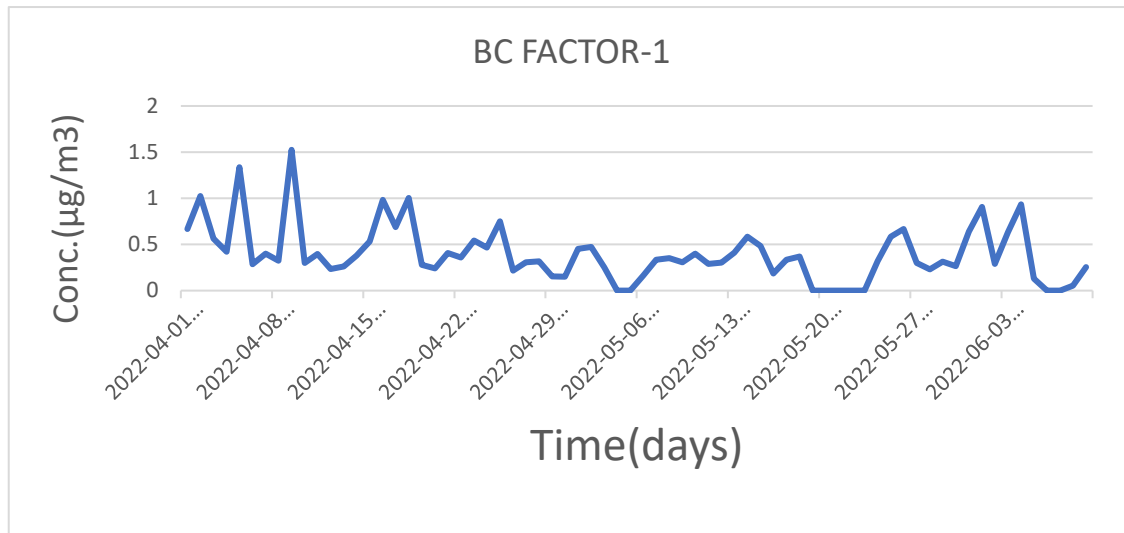
<u>Factors</u>	<u>Source</u>	<u>BC-Nomenclature</u>	<u>% contribution of BC to the source</u>
Factor-1	Waste Incineration	BC _{WI}	6%
Factor-2	Secondary Chloride	BC _{SC}	1%
Factor-3	Power Plants	BC _{PP}	1%
Factor-4	Dust	BC _D	0%
Factor-5	Lead Rich or local coal combustion.	BC _{Pb-Rich}	7%
Factor-6	Biomass Burning	BC _{BB}	39%
Factor-7	Industrial Emission	BC _{IE}	14%
Factor-8	Vehicular Emission	BC _{VE}	32%

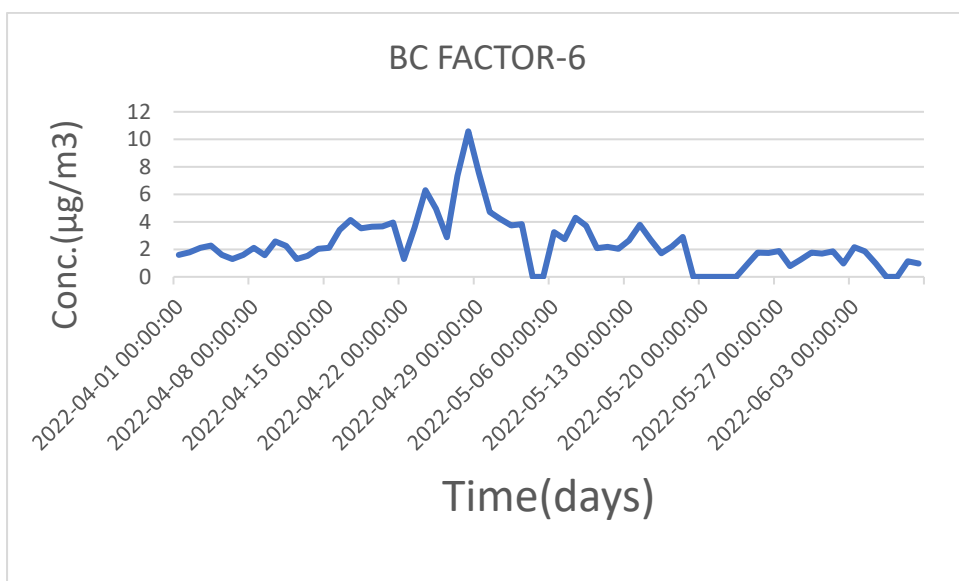
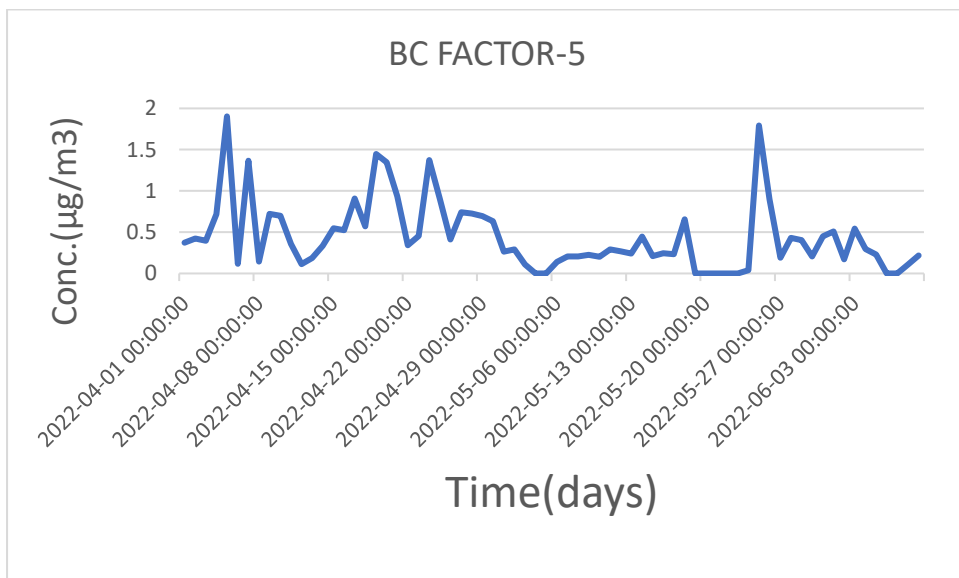
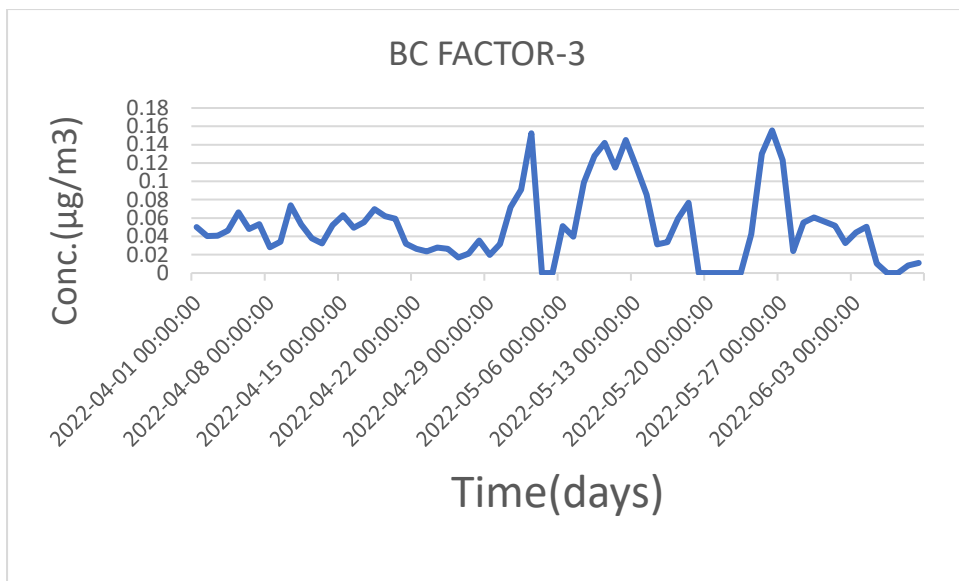
TIME SERIES ANALYSIS OF EACH BC FACTOR:

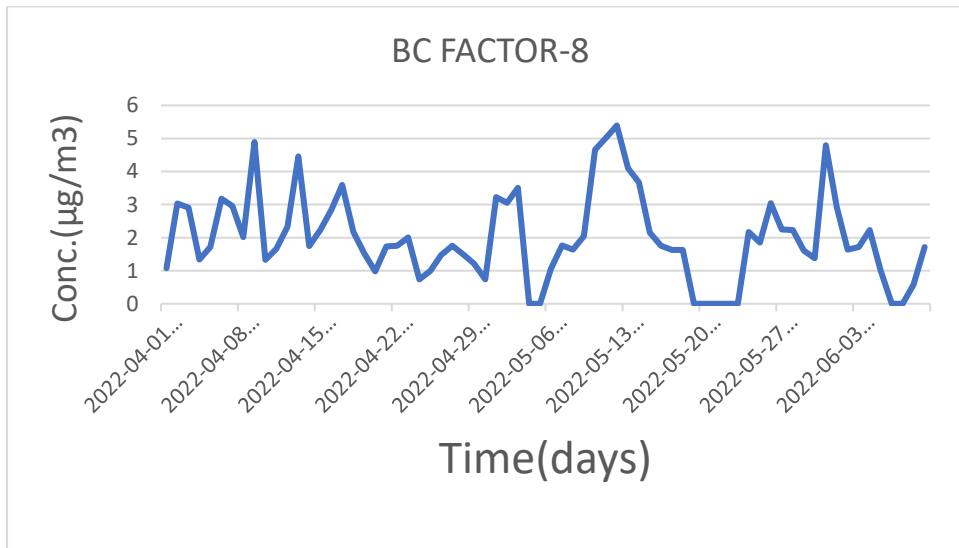
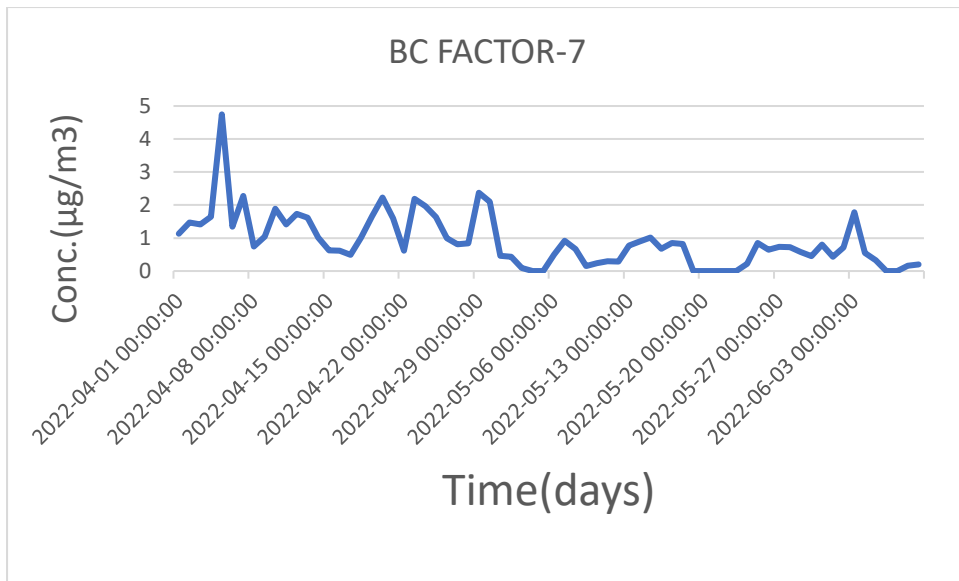
Y-AXIS:-MASS CONC. OF BC(micro-g/m³,earlier in assignment-2 the conc.was in nano-g/m³).

X-AXIS:-TIME

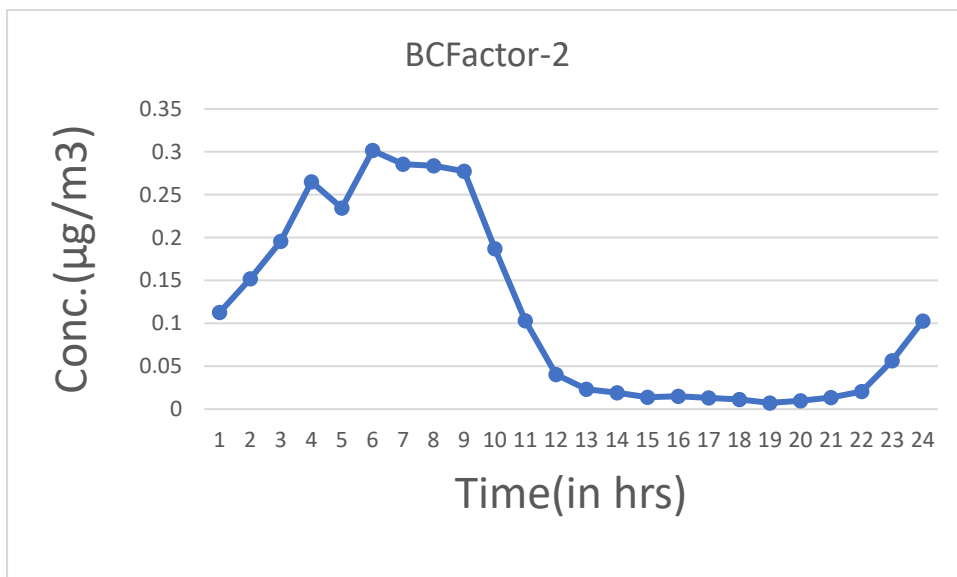
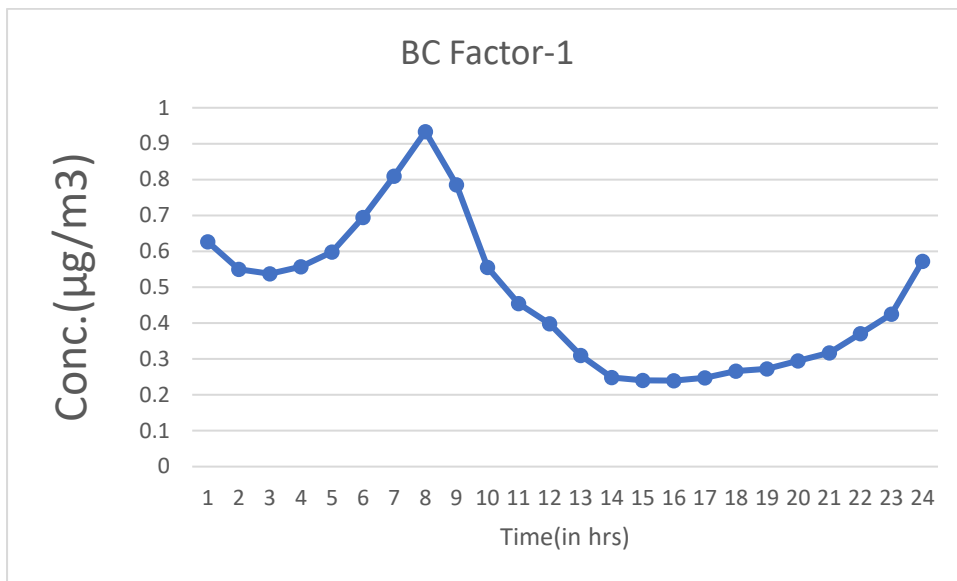
Daily variation:

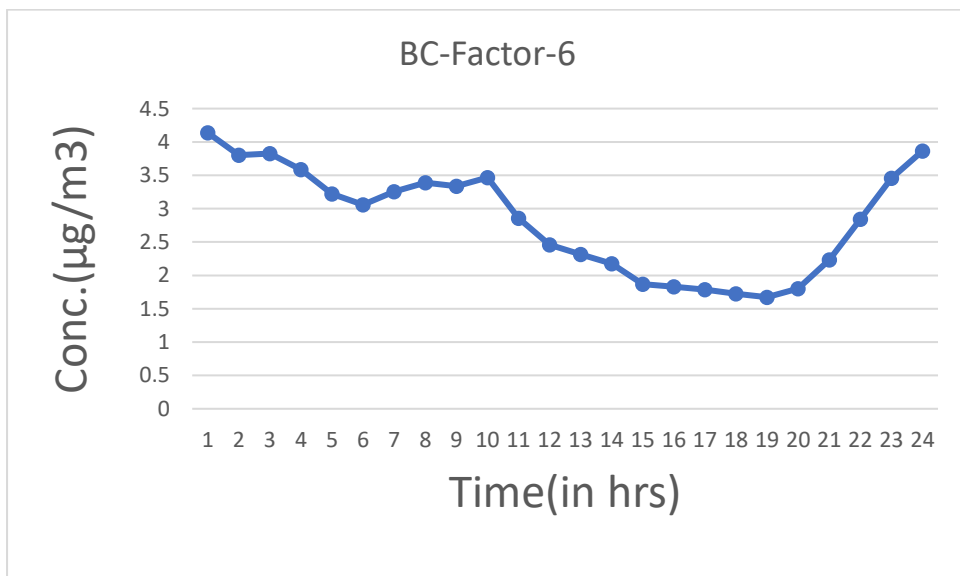
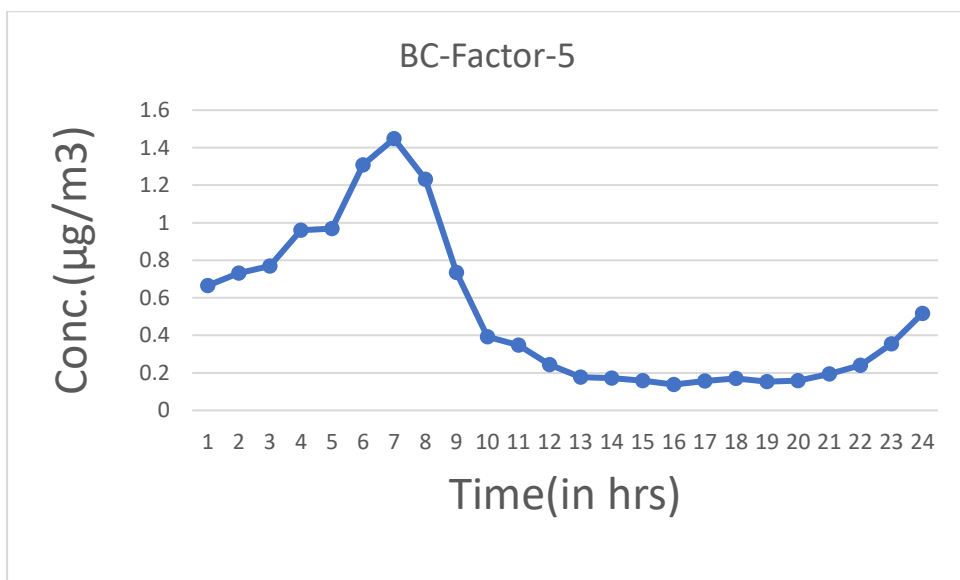
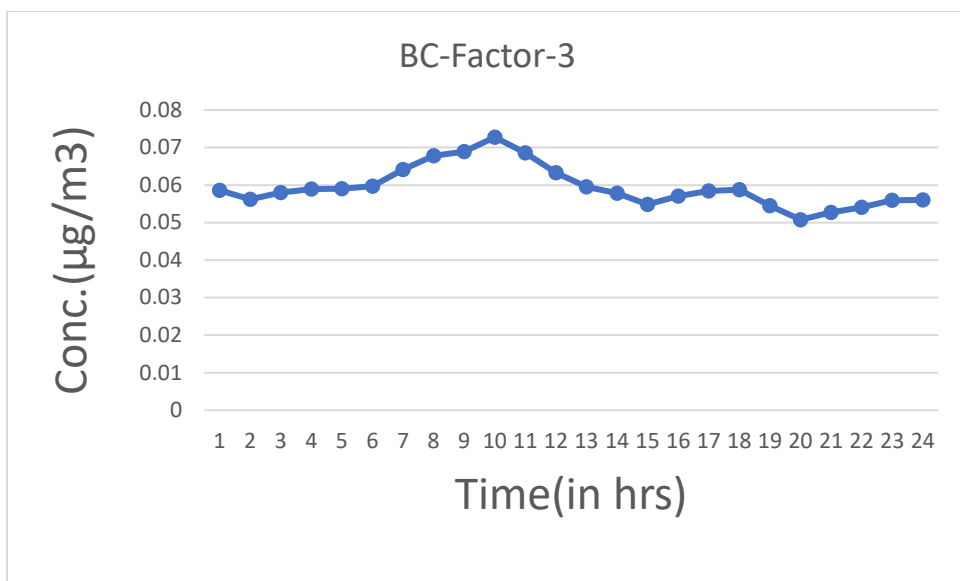


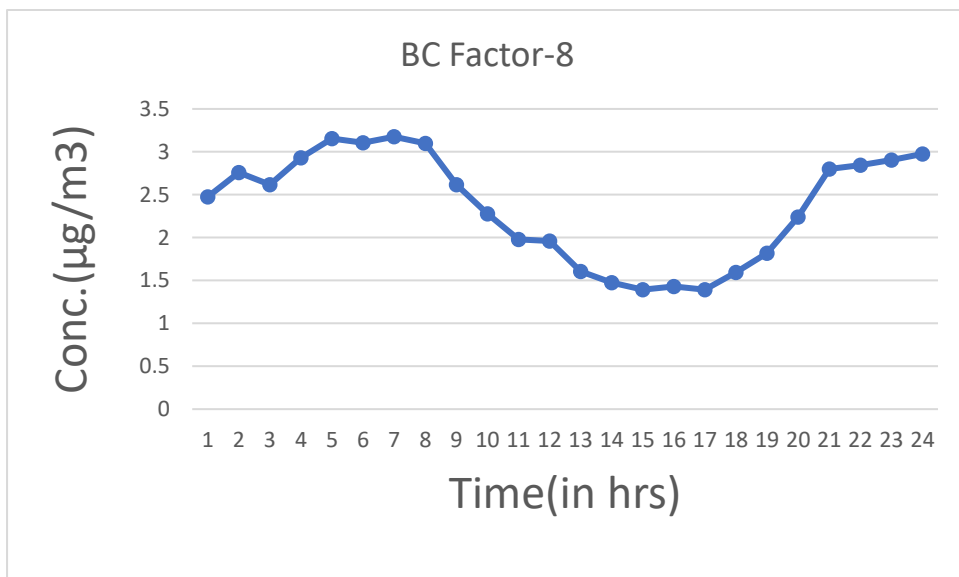
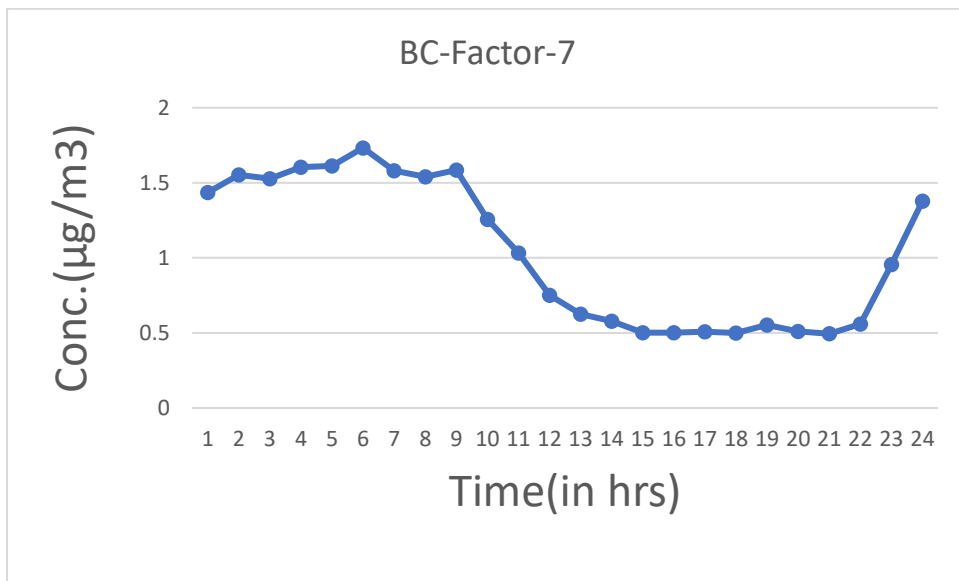




Diurnal variation:







4)CATEGORIZATION OF PMF-DERIVED BC SOURCES INTO FOSSIL FUEL BC(BC_{ff}),BIOMASS BURNING BC(BC_{bb}),MISCELLANEOUS SOURCES($BC_{misc.}$)

BC_{ff} :Power plants,vehicular emission.

BC_{bb} :Biomass burning

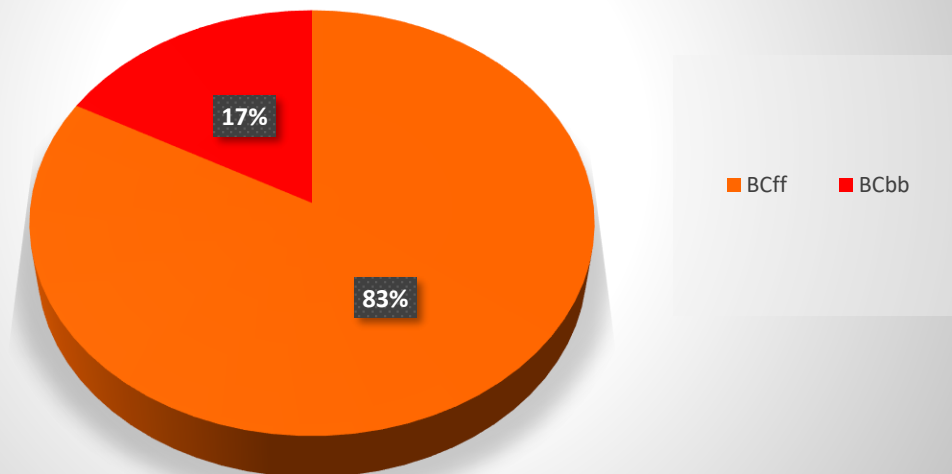
$BC_{(misc.)}$:Waste Incineration,Pb-rich,Industrial Emission,Secondary chloride.

Aethelometer model:

Average $BC6_{ff}$ Contribution: **83.00%**

Average $BC6_{bb}$ Contribution: **17.00%**

Contribution of biomass burning(BC_{bb}) and Fossil Fuel burning(BC_{ff}) to total $BC6$



Discussion:

Comparison of results of Aethalometer model and PMF Model:

	BCbb	BCff		BCmisc.			
	% and (mean conc.+/-std.)microgram/m ³	% and (mean conc.+/-std.)microgram/m ³		% and (mean conc.+/-std.)microgram/m ³			
Aethalometer model	17% (1.49±0.98)	83% (7.29±4.18)		N/A			
PMF Model	BC _{BB}	BC _{VE}	BC _{PP}	BC _{WI}	BC _{IE}	BC _{Pb-rich}	BC _{Sc}
	(4.1±2.1)	(2.94±1.84)	(2.37±0.81)	(1.09±0.87)	(1.62±1.38)	(0.7±0.96)	(4.15±5.74)
	39%	32%	1%	6%	14%	7%	1%

Graphical Comparison:

