

Supplementary Material

pH-Dependent Coloring of Combination Effect Pigments with Anthocyanins from *Brassica oleracea var. capitata* F. rubra

Orkun Çoruh ^{1,2}, Güngör Gündüz ³, Üner Çolak ^{4,5} and Bora Maviş ^{6,*}

¹ Institute of Science and Technology Austria, 3400 Klosterneuburg, Austria; mehmetorkun.coruh@ist.ac.at

² Nanotechnology and Nanomedicine Division, Hacettepe University, Beytepe, Ankara 06800, Turkey

³ Chemical Engineering Department, Middle East Technical University, Ankara 06531, Turkey; ggunduz@metu.edu.tr

⁴ Energy Institute, Istanbul Technical University, Maslak, İstanbul 34469, Turkey; unercolak@itu.edu.tr

⁵ Nuclear Engineering Department, Hacettepe University, Beytepe, Ankara 06800, Turkey

⁶ Mechanical Engineering Department, Hacettepe University, Beytepe, Ankara 06800, Turkey

* Correspondence: bmavis@hacettepe.edu.tr; Tel.: +90-312-297-6210

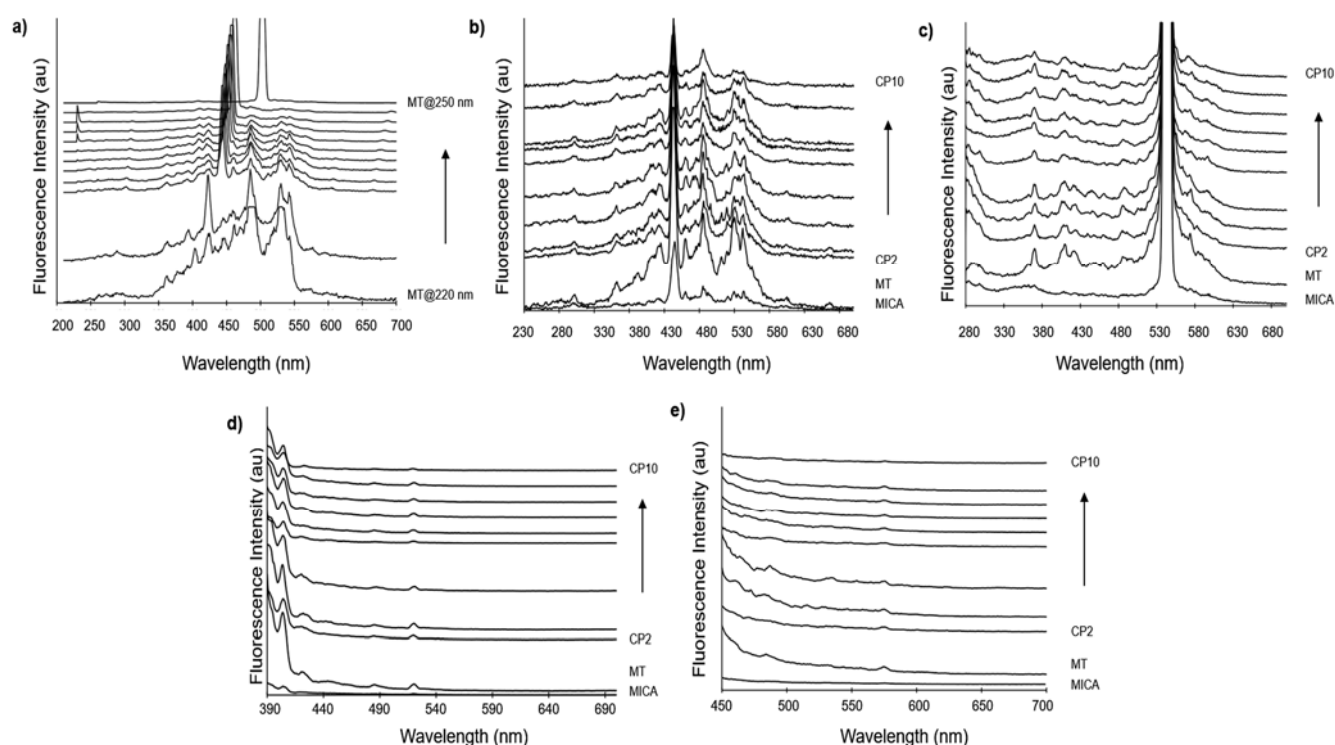
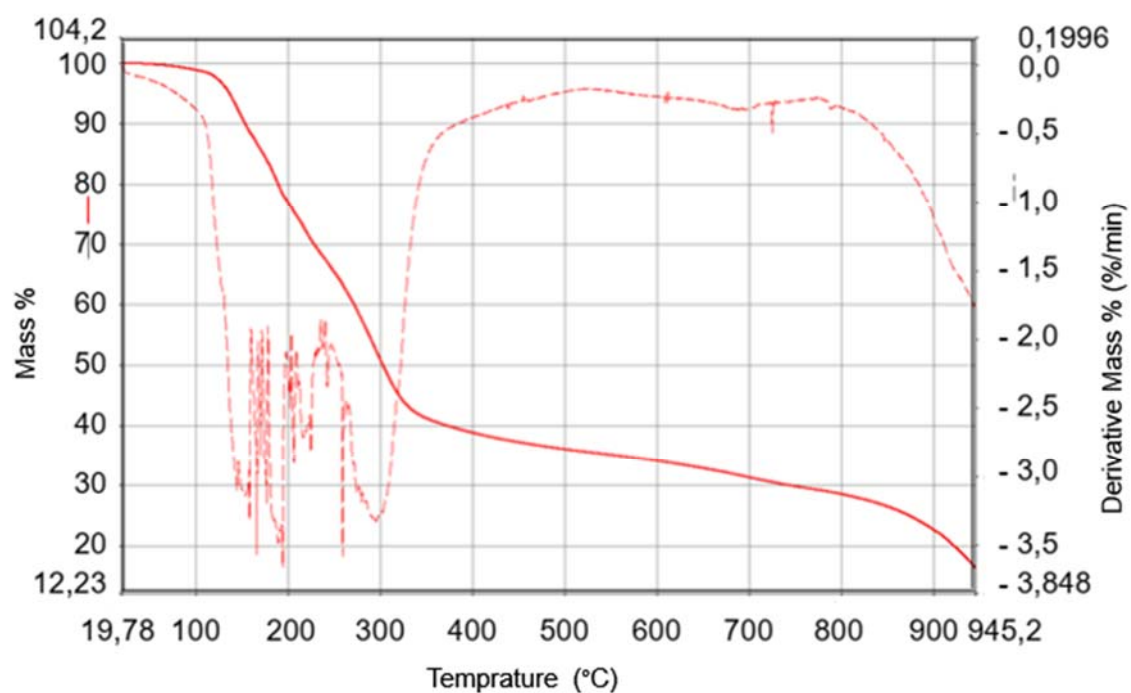


Figure S1. Fluorescence spectra of; (a) MT with excitations from 220 to 250 nm, (b) (c) (d) (e) Mica, MT and CP's at 220, 270, 380 and 420 nm excitation wavelengths, respectively. pH range of 2 (bottom) to 10 (top).

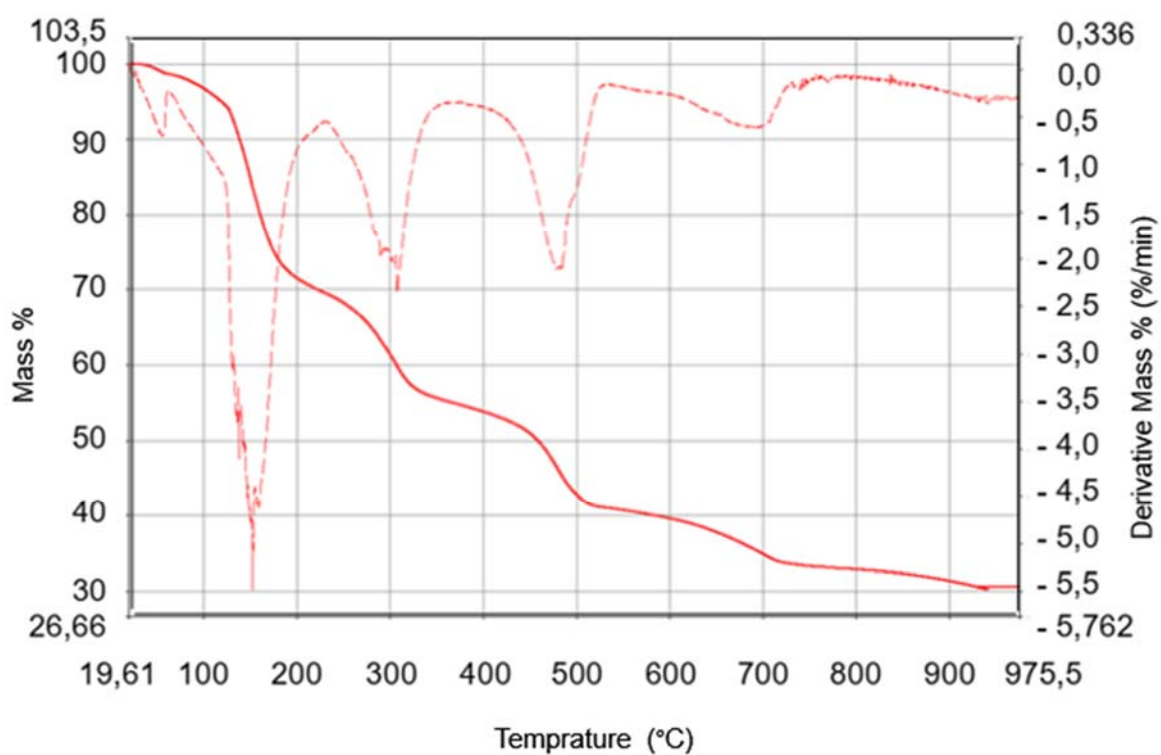


Figure S2. The color change among fresh (top) and aged (bottom) extracts in a pH range of 2 (left) to 10 (right).

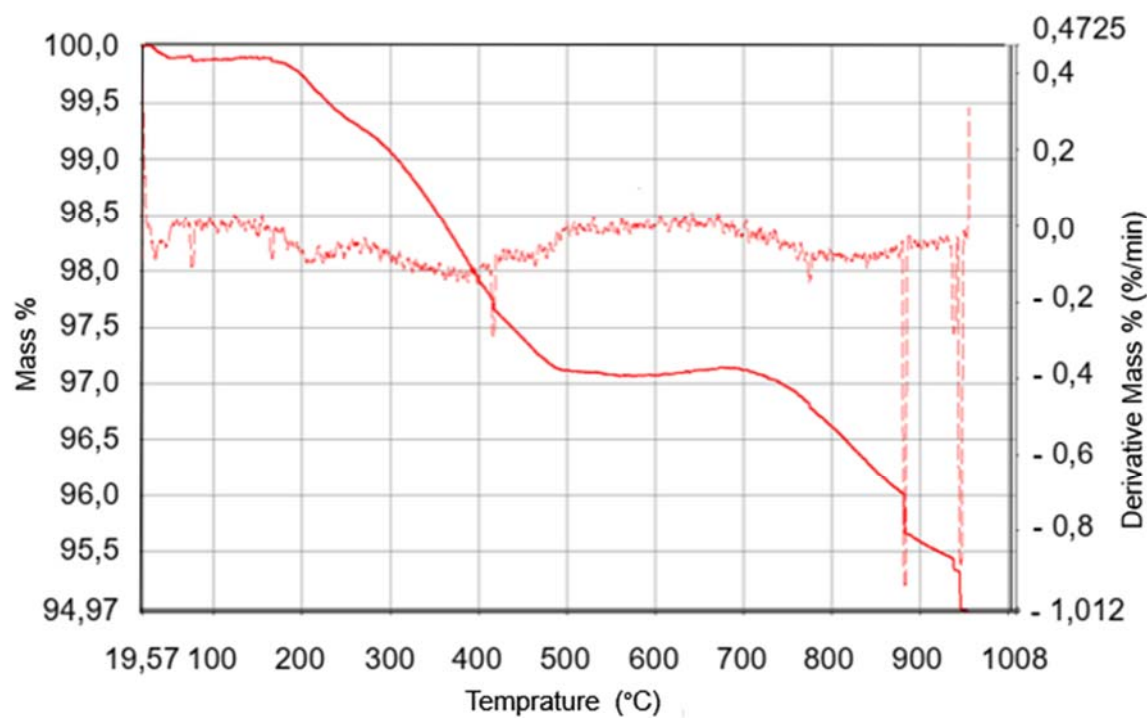
a)



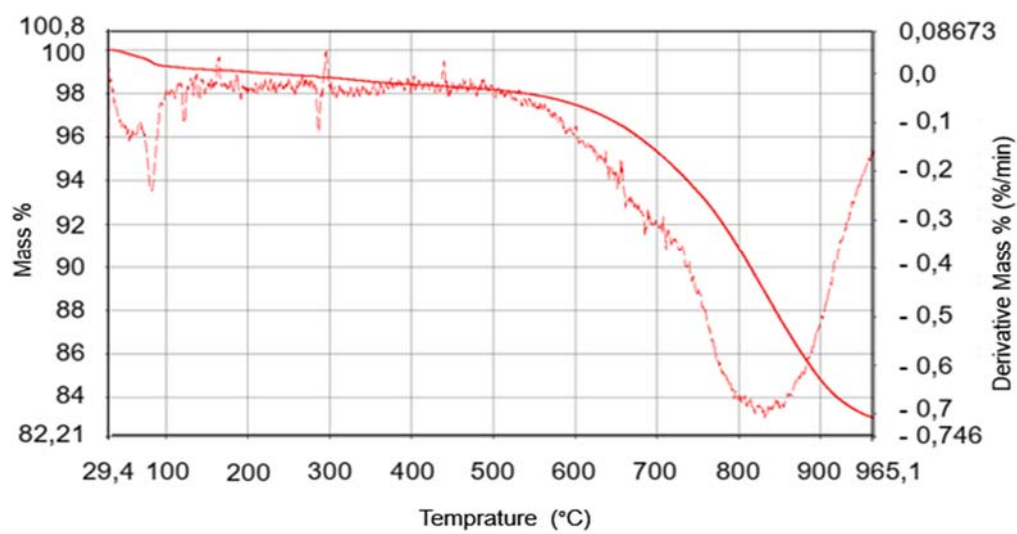
b)

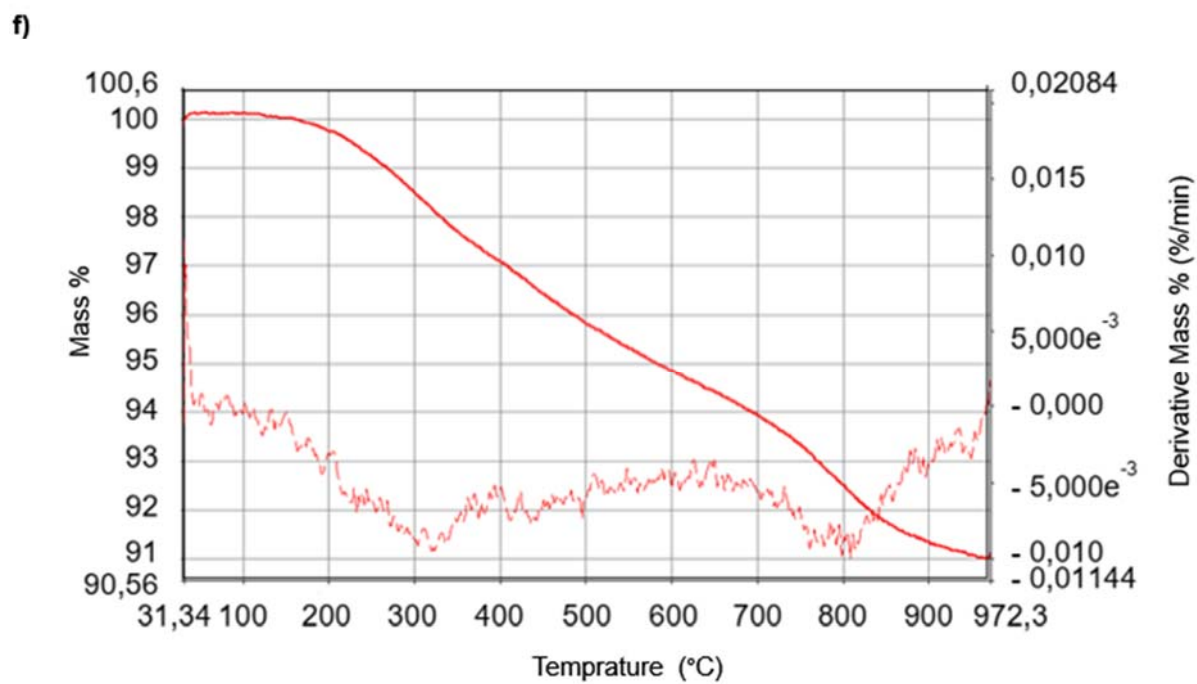
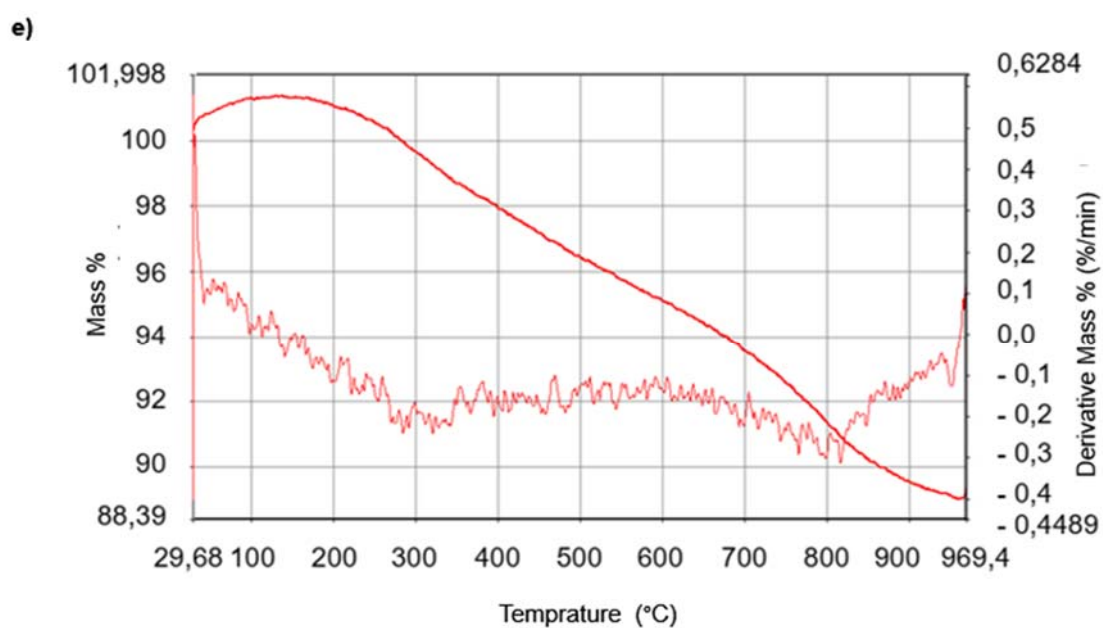


c)

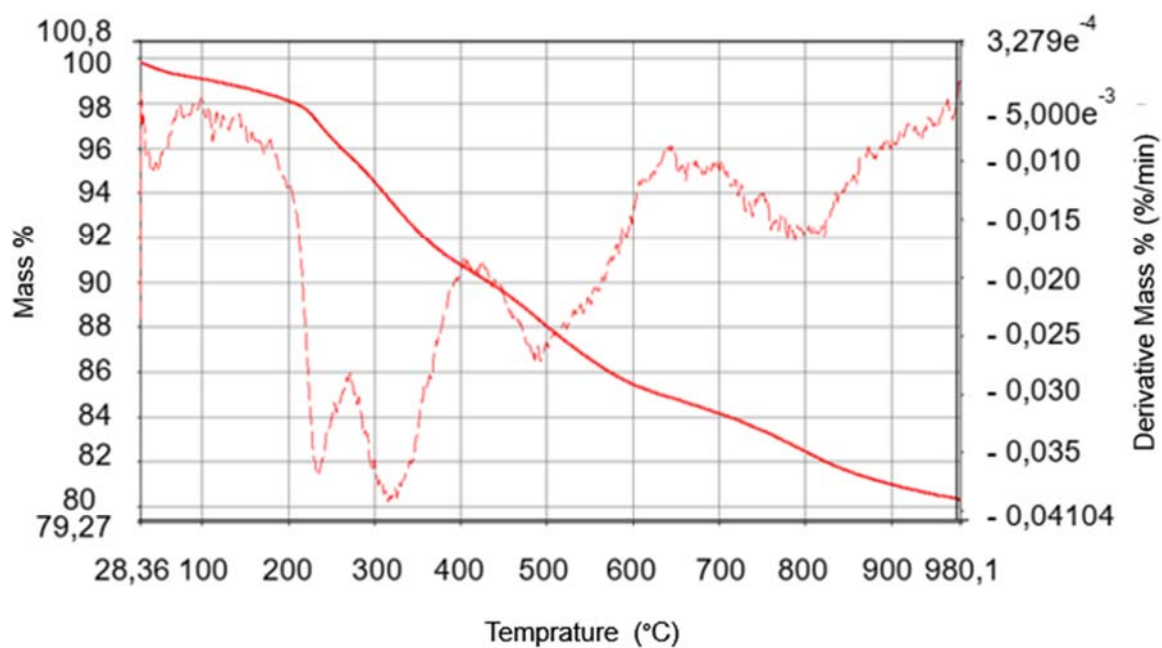


d)

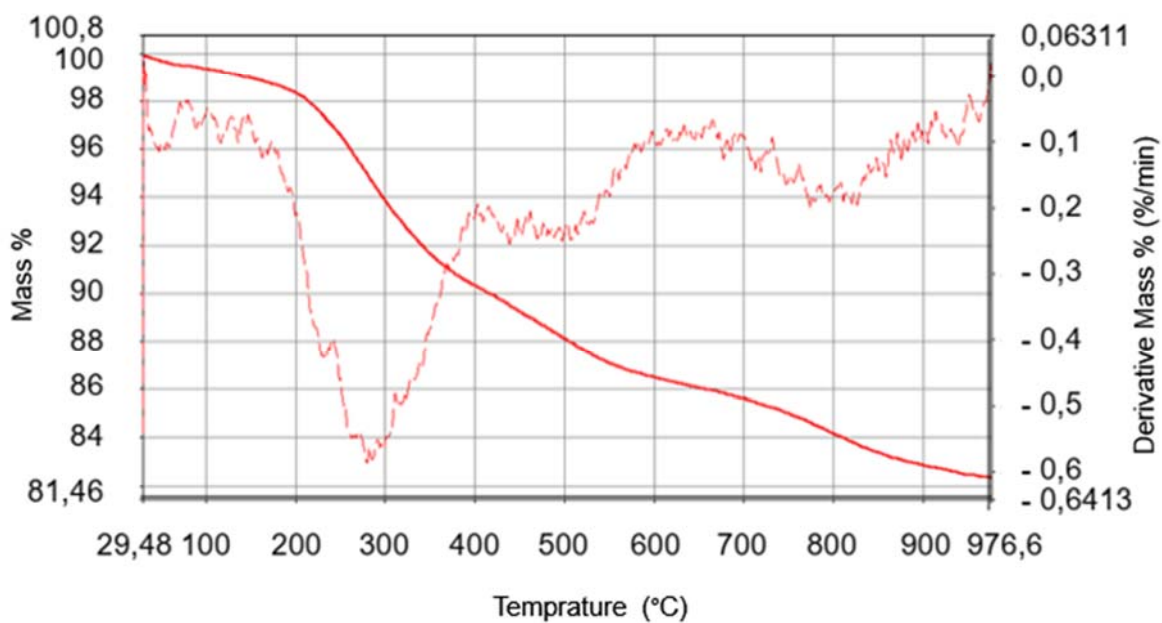




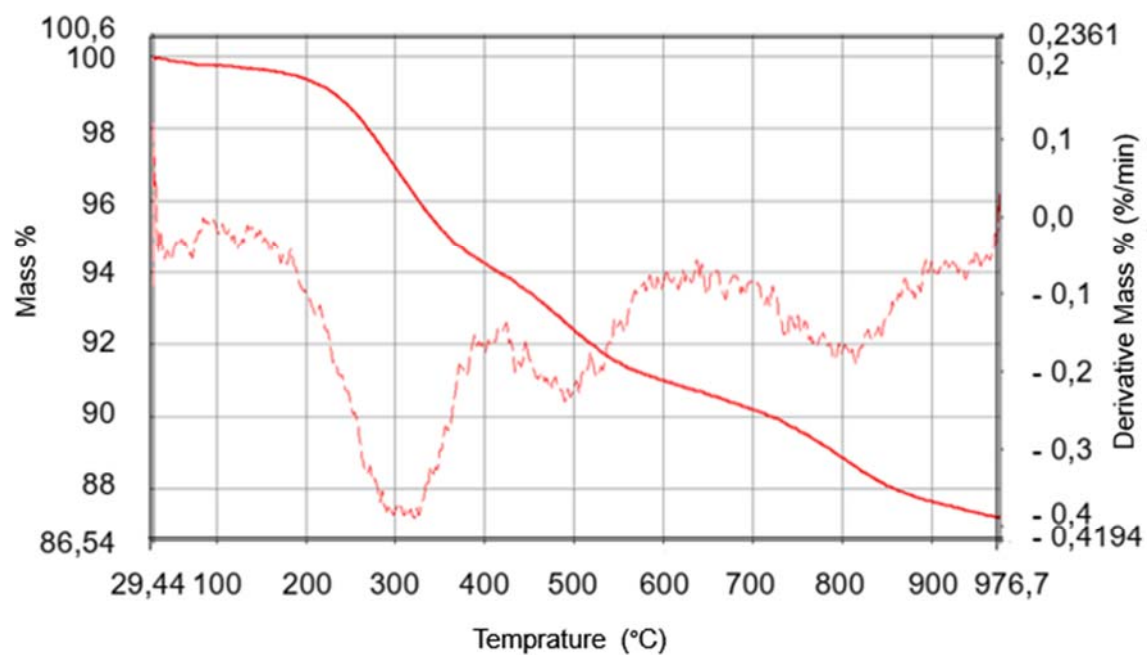
g)



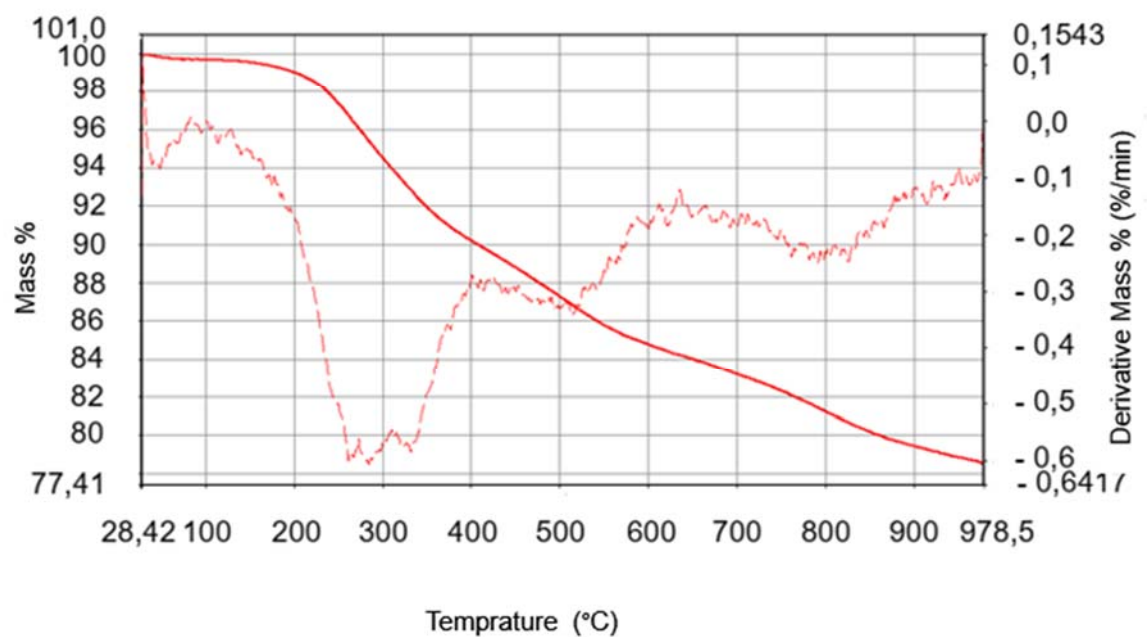
h)

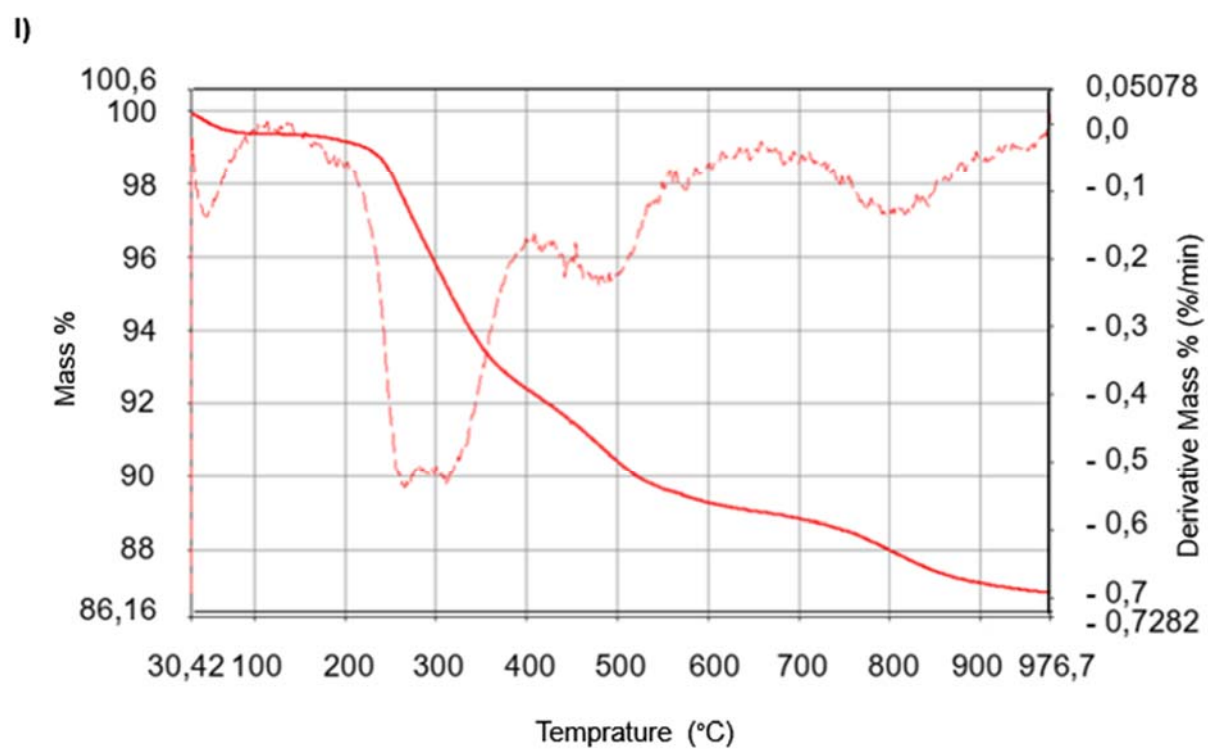
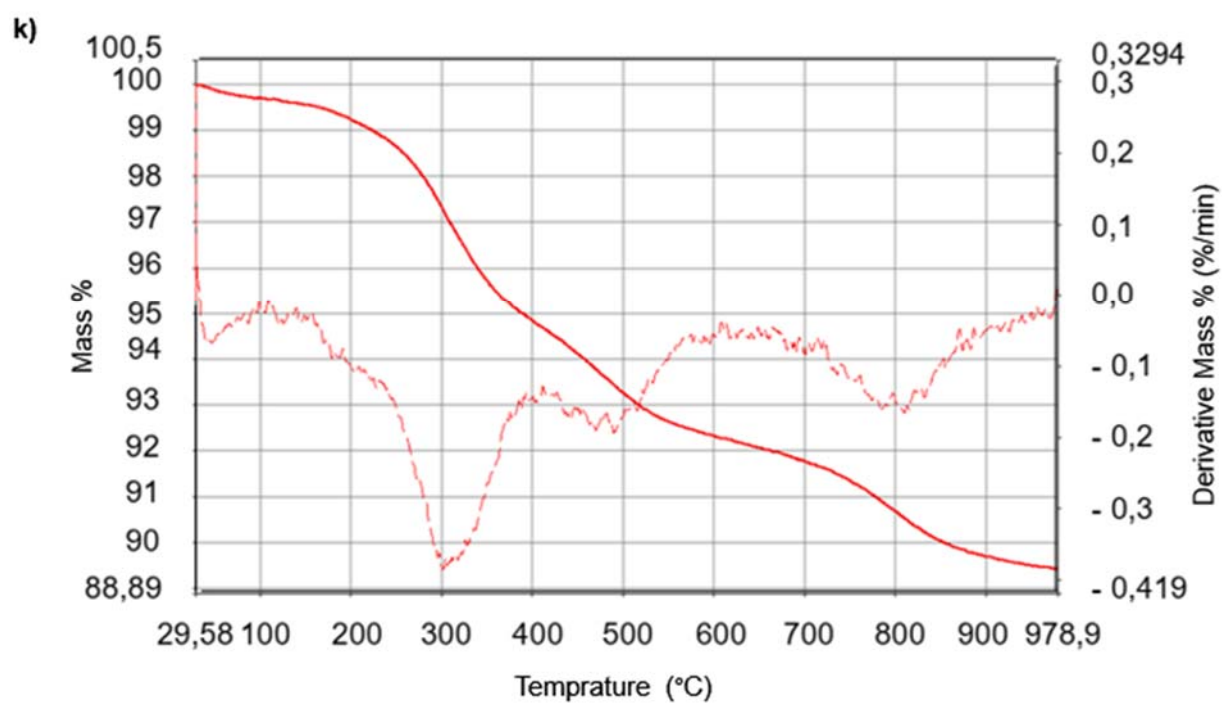


i)



j)





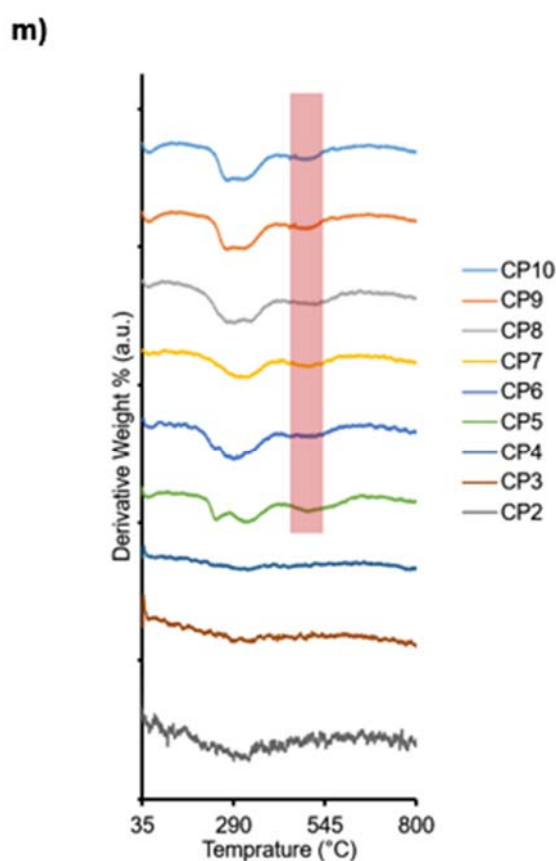


Figure S3. TGA of ACN at pH values of; (a) 2 and (b) 5, MT (c) and CPs prepared at pH values of; (d) 2, (e) 3, (f) 4, (g) 5, (h) 6, (i) 7, (j) 8, (k) 9, (l) 10. (m) Comparative Derivative TGA plots for CP.

Table S1. TGA data analyzed with Equations 1-3.

Sample	WL _{800maxACN} (%)				
ACN @ pH = 2	71 ¹				
ACN @ pH = 5	67 ¹				
Sample	WL ₈₀₀ (%)	WL _{800corr} (%)	$\frac{ACN}{CP}$ (%) ³	$\frac{ACN}{CP}$ (%) ⁴	CE (%) ⁵
MT	3.6	—	—	—	—
MTA2 ²	9.0	5.4	7.8	92.2	9.1
MTA3	8.7	5.1	7.4	92.6	8.6
MTA4	7.5	3.9	5.7	94.3	6.6
MTA5	17.5	13.9	20.1	79.9	23.4
MTA6	16.0	12.4	18.0	82.0	20.9
MTA7	11.0	7.4	10.7	89.3	12.5
MTA8	19.0	15.4	22.3	77.7	26.0
MTA9	9.5	5.9	8.6	91.4	9.9
MTA10	12.0	8.4	12.2	87.8	14.2

¹ Average of these values (i.e. 69 wt.%) was taken the highest possible percent weight loss from any ACN up to 800°C (WL_{800maxACN}).

² MTA#: MT – ACN combination pigment prepared at a pH value of #.

³ According to Equation (1).

⁴ According to Equation (2).

⁵ According to Equation (3).