

# Band Diffusion at High Temperature

J. Wanna and J. M. Loureau  
SWM Intl.  
100 Northpoint Center East  
Suite 600  
Alpharetta, GA 30022

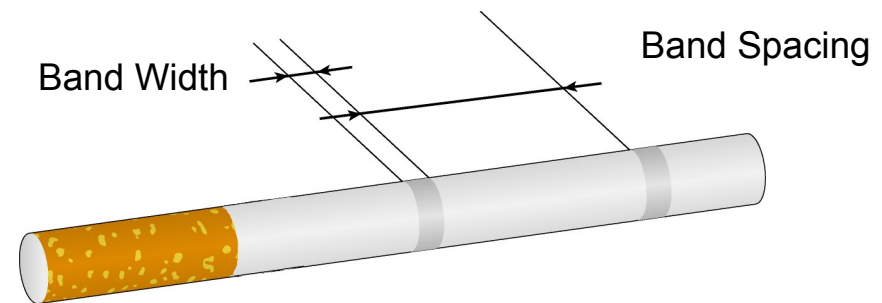
# Agenda

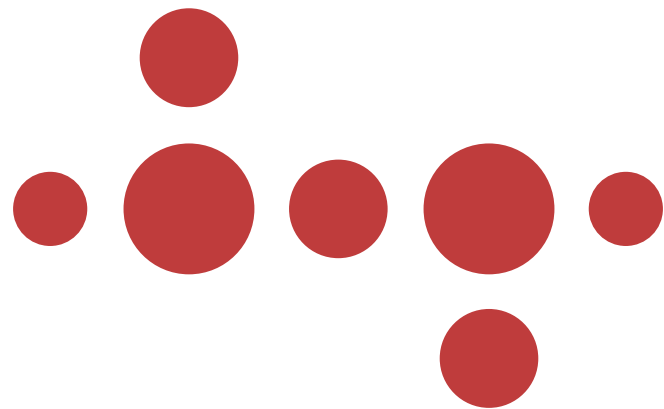


- 1 Introduction
- 2 Experimental
- 3 Results
- 4 Summary

# Introduction

- Almost all cigarette designs that meet ASTM E2187-09 “Standard Test Method for Measuring the Ignition Strength of Cigarettes” use cigarette paper with bands
- Bands limit air diffusion to the coal
- Cigarette design along with band property determine SE on the ASTM test method
- Band diffusion impacts ASTM performance
- The results are from a preliminary investigation of this topic





Experimental

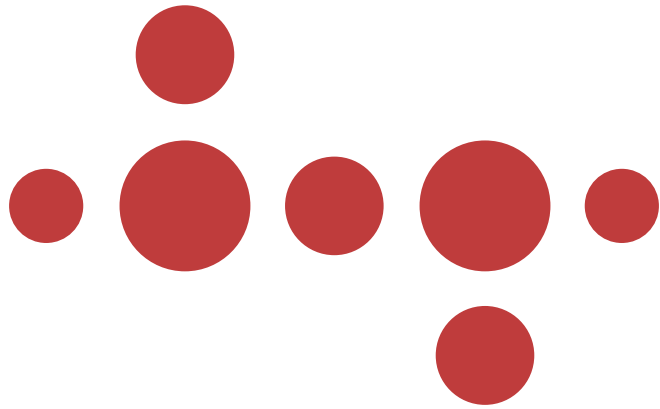
# Experimental

- There is no standard experimental procedure
- Sodim diffusivity meter was used
- Lab condition at 50%RH and 23°C
- Binder oven was used with set temperature at 230°C for 30 minutes
- After heating, samples were conditioned in the lab for 30 minutes

# Experimental

- Three samples were to constant basis weight, permeability, and citrate level
  - Three filler levels
  - Two printed to low diffusion target
- Additional three samples were prepared with three citrate levels
  - Two printed to different diffusion targets

Code	Filler	D* at RT		D* at 230°C	
		Band (cm/sec)	Base (cm/sec)	Band (cm/sec)	Base (cm/sec)
43	28	0.050	1.087	0.837	1.388
44	26	0.070	1.200	0.914	1.478
45	24.6	0.068	1.072	0.715	1.244
50	26	0.019	1.192	0.695	1.425
51	24.6	0.022	1.003	0.575	1.171



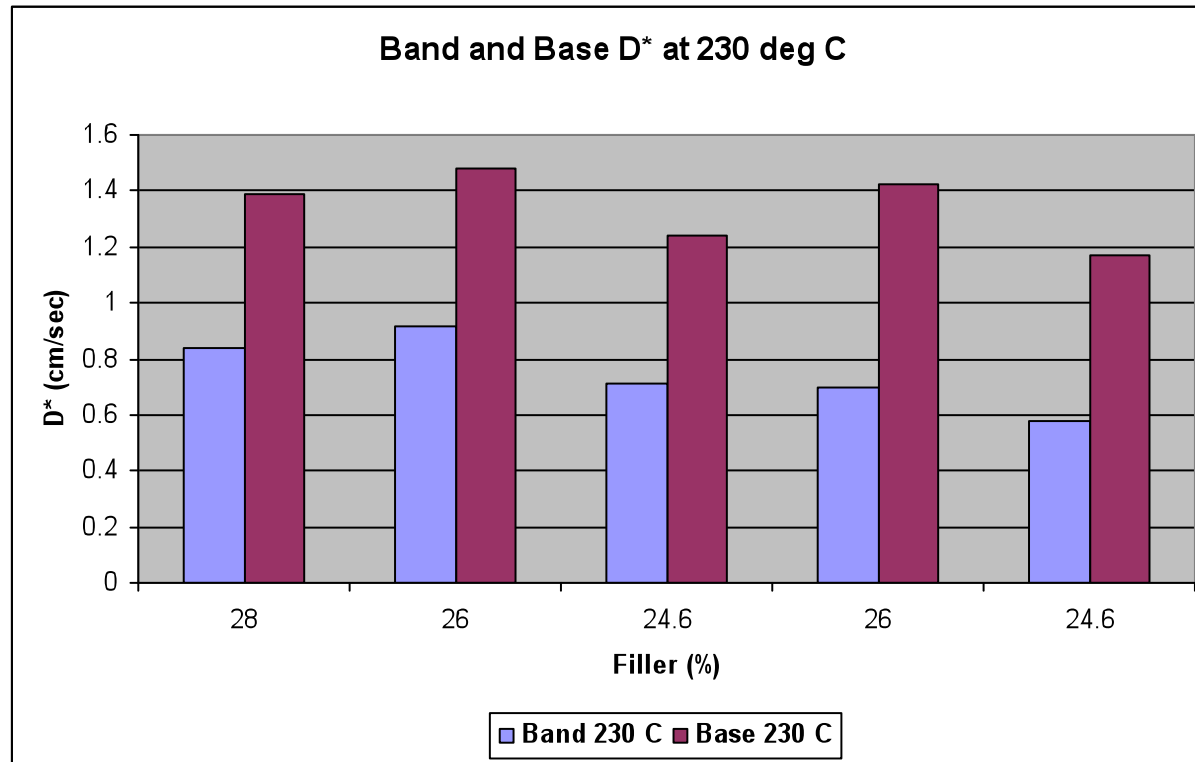
# Results

# Results

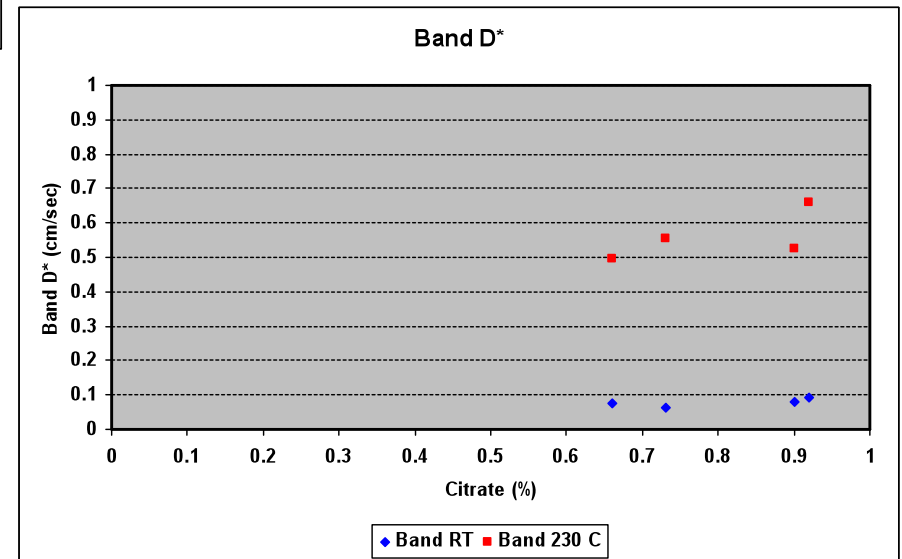
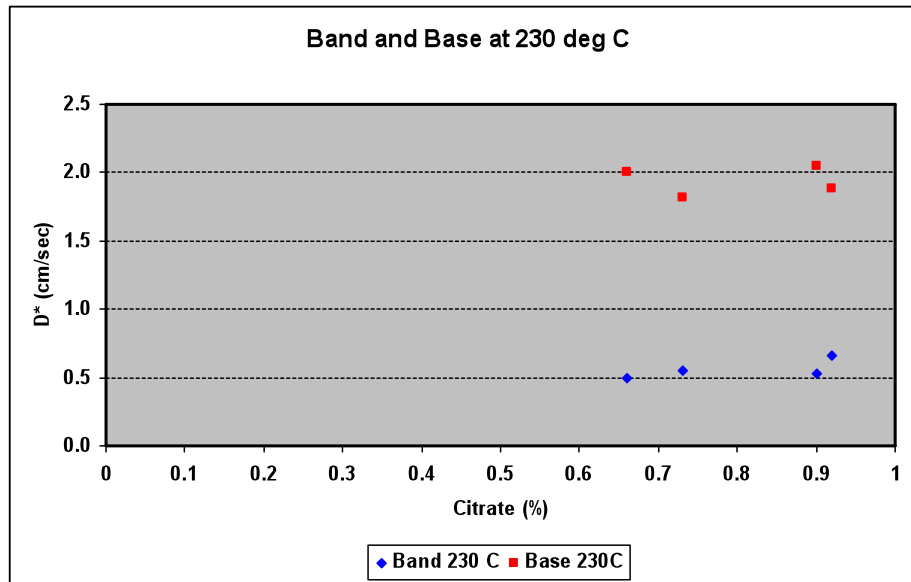
- All products gave ASTM >85% SE
- Diffusion at high temperature depends on how the sample is placed in the oven to ensure even, repeatable and reproducible heating



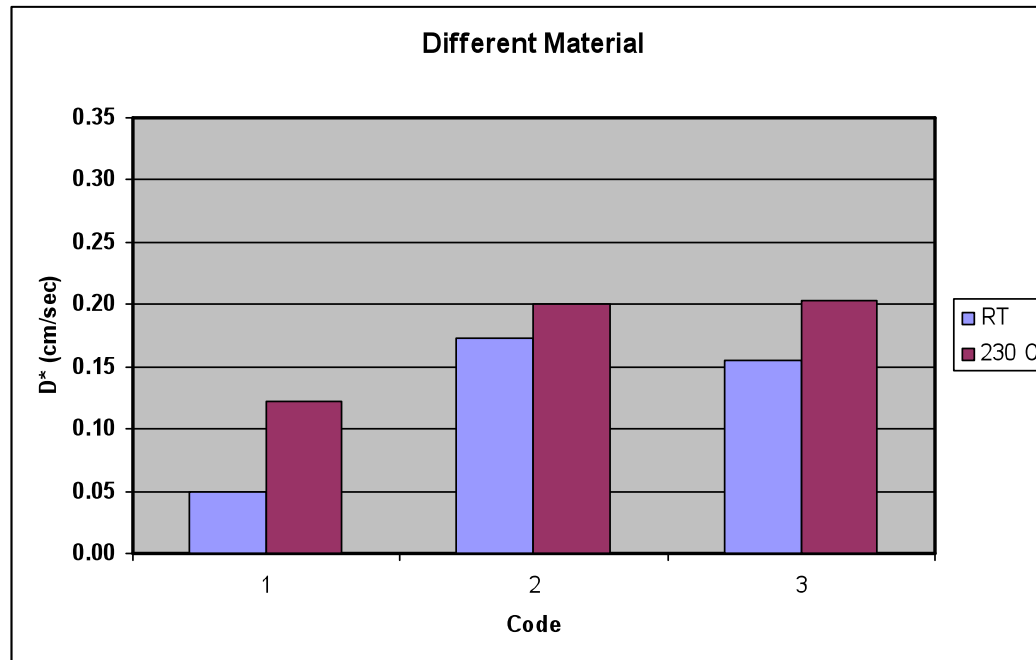
# Band and base D\* at 230 deg C – Filler



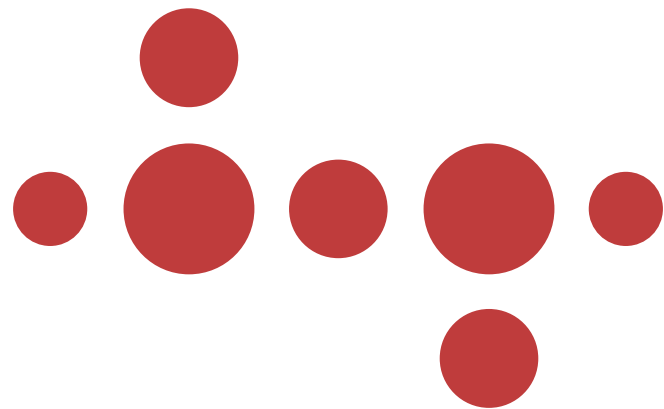
# Band and base D\* at 230 deg C – Citrate



# Band D\* at 230 deg C – Band Material



- Samples collected from cigarettes purchased in the market place
- Influence of base paper not taken into account



# Summary

# Summary

- All products gave ASTM >85% SE
- ASTM results depend on total cigarette design
- Diffusion at high temperature depends on how material is placed in the oven to ensure even, repeatable and reproducible heating
- Diffusion at high temperature (in this study 230°C) depends on band material, filler, and citrate
- Higher filler and citrate levels produce higher diffusion when material is heated to 230°C
- Additional parameters will have to be investigated such as various heating regimes, interactions among parameters, others
- The band encounters a non-uniform heating regime in actual use wrapped around a tobacco column

# Thank You



Joe Wanna

**SWM INTL**

100 Northpoint Center East  
Suite 600  
Alpharetta, GA 30022  
USA

[swmintl.com](http://swmintl.com)