



Advances in Paper & Board Treatment for Food & Specialty Packaging

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Outline:

- Requirements for oil & grease barrier performance in food & specialty packaging
- Regulatory support for new-generation fluorochemicals
- Chemistry & structural/performance relationships
- Commercial & retail applications & trends

Requirements for Barrier Performance

- Paper & board grease barrier packaging can be broadly categorized into 4 groups:
 - Wrap & containers for Quick Service Restaurants (QSR)
 - Multiwall bag for retail & pet food
 - Popcorn bag (with microwave susceptor)
 - Specialty & retail box

Requirements for Barrier Performance

- The types of barrier chemistries in use:
 - Film (physical) barriers
 - Hydrocarbon – LDPE, PP, wax
 - Synthetic – PVAc, PET, cPET, PVOH
 - Latex – acrylic, styrene acrylic, SB, vinyl acrylic
 - Natural – modified starches
 - Chemical barriers
 - Perfluoroacrylate copolymers (PFA)
 - Perfluoropolyethers (PFPE)
 - Other
 - Pigment – hyper-platy kaolin

Requirements for Barrier Performance

- Measures of grease barrier performance:
 - Mill/general tests:
 - Kit, folded Kit,
 - Hot oil
 - RP-2, AGR
 - Turpentine
 - Real world tests:
 - Jungle room
 - Hot box
 - Test Kitchen



Worldwide Regulatory Update

- Grades made using fluorochemistry in the paper industry are moving to PFOA-free treatments.
 - Many definitions of PFOA-free
- Support is global for new PFOA-free fluorochemistries as evidenced by approvals.
 - EPA, FDA, BfR, FSA, China MOH, METI, Health Canada, etc.

Worldwide Regulatory Update

No concern over fluorinated chemical levels in food - FSA

By Rory Harrington, 20-Oct-2009

There are no human health concerns over current dietary exposure to a range of fluorinated chemicals, such as PFOS and PFOA, the UK Food Standards Agency (FSA) has said

The food safety watchdog came to its conclusion after testing a range of retail foods for [fluorinated](#) substances - including [perfluorooctane sulphonate](#) (PFOS) and [perfluorooctanoic acid](#) (PFOA).

Results from the tests showed that average adult dietary intake of the chemicals in 2007 fell well below tolerable daily intake levels set by the European Union, said the FSA.

<http://www.foodproductiondaily.com/Quality-Safety/No-concern-over-fluorinated-chemical-levels-in-food-FSA>

Chemistry Structure/Performance

- Types of fluorochemicals:
 - Polymeric – best from environment/transport
 - Perfluoroacrylate (PFA) – C-6 and C-4 copolymers
 - Perfluoropolyether (PFPE) – C-2/C-3 cross-linked
 - Surfactant – best for performance
 - Fluorophosphate – C-8 phosphate ester

Performance – OGR chemistries in lab

Fluorochemistry		PFA U1	PFA U2	PFPE 1	PFPE 2	PFA A	C-8 Surf
Ionic Charge		anionic	nonionic	anionic	anionic	cationic	(phos)
Repellency	Cobb60	28	101	100	95	20	81
	Kit	9.5	6.5	7	3.5	4.5	6.5
	Turpentine (sec)	1800+	60	180	0	60	1800+
	Hot Oil	5	5	5	3	5	

Paper: 60 lb/3300 sq.ft. bleached, lab size press

Starch: ethylated corn, 1.5%

Fluorochemical: 0.2% OWB

Performance – OGR on Paper & Board

Performance comparison on various paper grades

Paper	Kit			Hot Oil		
	PFA U2	PFPE 1	PFA A	PFA U2	PFPE 1	PFA A
Lab hand sheet (70)	8	7	9	5	5	5
Bleached (46)	10	5	8	5	3	4
Unbleached (34)	8	5	7	5	5	5
Bleached (34)	9	8	7	5	5	5
Bleached (60)	7	6	5	5	5	4
Bleached (90)	9	6	2	5	5	0
Bleached (120)	8	6	5	5	5	0
Bleached Board (280)	6	5	0	4	5	0

() : weight of paper, gsm

Performance – OGR in Pilot Trial

Paper: 20.5 lb/3300 sq.ft. bleached
Application: pond size press
Starch: ethylated corn

Performance comparison at low dosage On high speed pilot size press

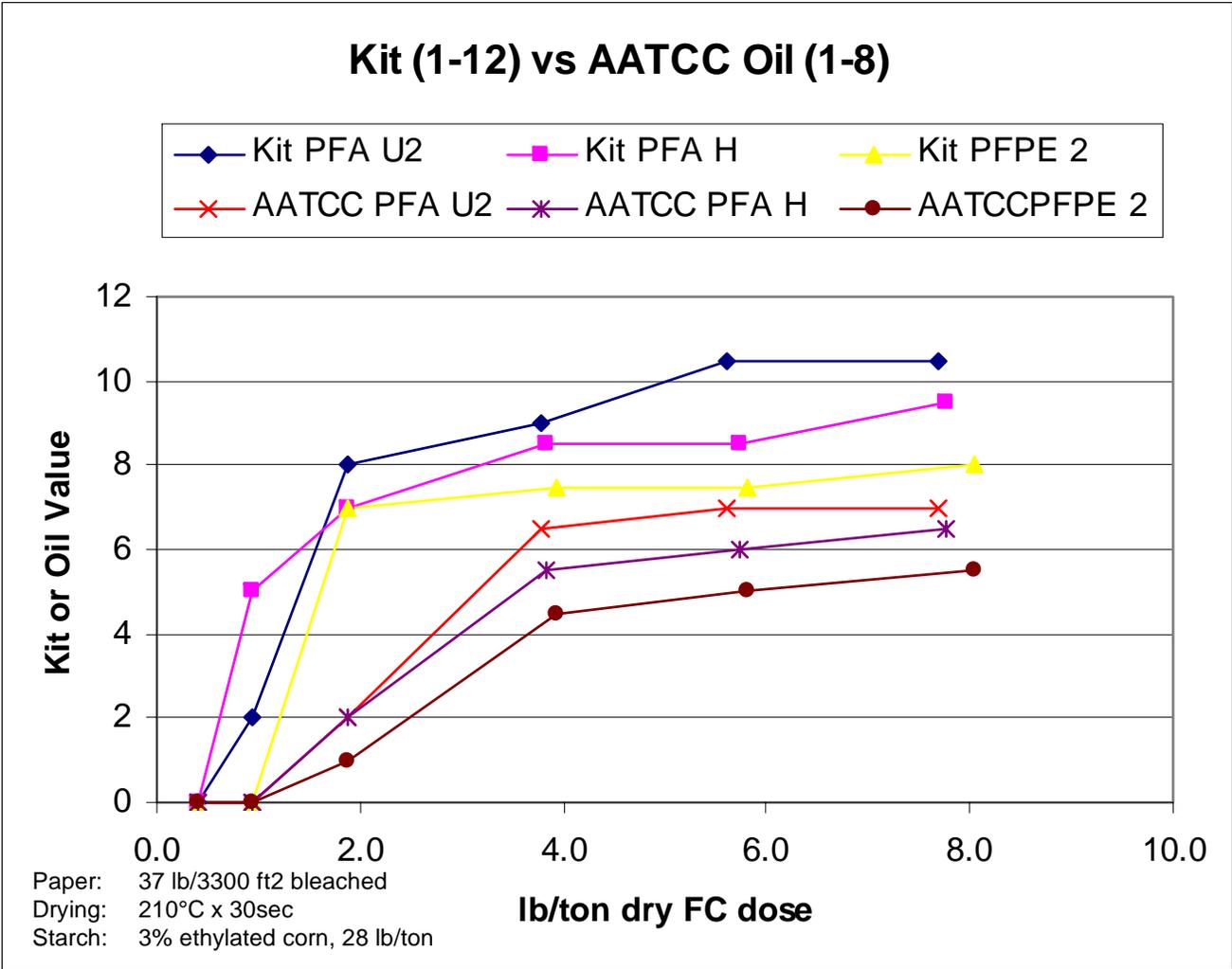
Sample	Product	Starch	# dry/ton	% product in solution	Kit	Other Kit	Hot corn oil	Hot olive oil
1	PFA U2	2%	1.0	0.25	5	4	4	4
2		2%	2.0	0.5	8	4	5	4
3		4%	1.0	0.25	6	4	4	4
4		4%	2.0	0.5	8	6	5	5
5	PFPE 1	2%	1.0	0.25	3	3	0	0
6		2%	2.0	0.5	5	4	4	3
7		4%	1.0	0.25	2	3	0	0
8		4%	2.0	0.5	4	4	4	4

Performance – OGR Alternative Tests

3M Kit test has its drawbacks

There are alternatives we can borrow from other industries

AATCC method
118-2007
Equivalent to
ISO 14419



Retail Applications/Trends

- Retailers have gone to great lengths to hide oil & grease stains in packaging
 - Opportunity exists to simplify the package to reduce costs & improve target performance

Retail Applications/Trends

- Focus continues on optimizing the package economics, environmental impact & marketing value
 - Mini-flute for lower weight/better insulation
 - Coated outer layers for improved print quality
 - Replacement of EPS (California)

Retail Applications/Trends

- Retail packaging alternatives to paper & board continue to be a force
 - Multi-wall bag continues to face PP challenge
 - This is an area where paper can win back share on the environmental front

Retail Applications/Trends

- Products going into the packages continue to evolve & require higher performance
 - Oils used in preparing foods are changing in attempts to improve health impacts
 - This in turn can lead to higher performance requirements in the packaging

Retail Applications/Trends

- Future trends
 - Molded pulp QSR
 - Press-applied barrier
 - Increased focus on recyclability
 - Environmental ‘depth-check’



The obscure we see eventually. The completely obvious, it seems, takes longer. ~Edward R. Murrow





Thank you

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