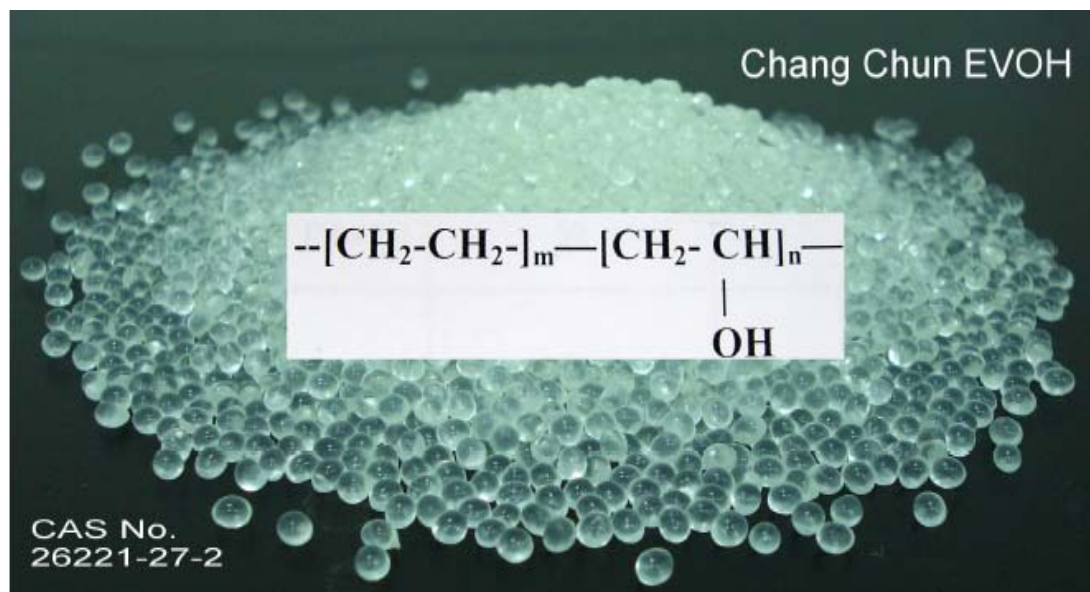


EVASIN EVOH



Evasin EVOH

- **Excellent barrier material for oxygen and flavors**
- **Low gel content and outstanding thermal stability**
- **Easy processability by blow, cast, blow molding technologies**
- **From 29% to 44% ethylene**
- **Can be supplied in combination with Orevac tie layers**
 - PE/EVOH/PE, PP/EVOH/PP, PET/EVOH/PE, PS/EVOH/PE
- **Technical support by Arkema experts**
- **Arkema: exclusive distributor of Evasin EVOH in Europe**
- **Produced by Chang Chun Petrochemicals in Taiwan**

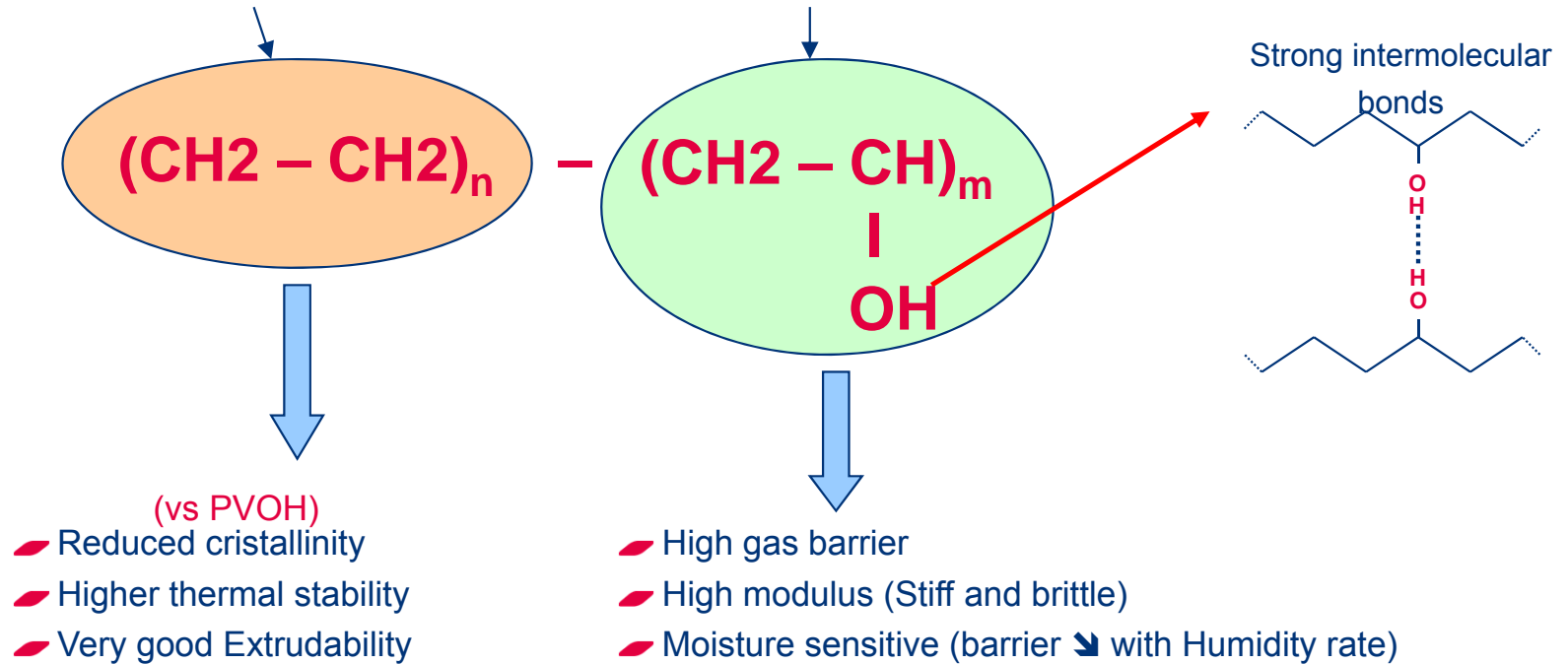
Evasin Product Range proposed by Arkema

Grade	Ethylene content %	MFI g/10min 2.16kg 190° C 210° C		Density g/cm ³	Tm ° C	Tg ° C	OTR @ 65%RH cc20µm/m ² -day- atm
EV-2951F	29	-	3	1.2	187	60	0.3
EV-3251F	32	1.6	3.5	1.19	183	62	0.38
EV-3851F	38	1.6	3.7	1.17	173	58	0.74
⁽¹⁾ EV-4451F	44	1.8	-	1.14	167	56	1.35
⁽¹⁾ EV-4405F	44	5.5		1.14	166	56	1.35

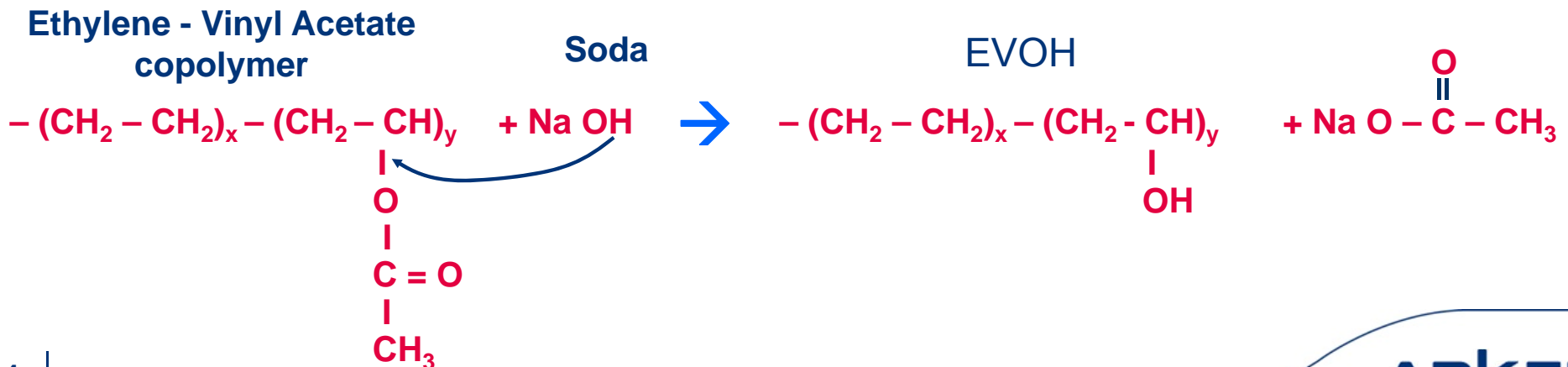
- (1) Grade under development
- (2) All grades available in moisture-proof 25kg bags or 750kg boxes
- (3) 3851V also available for blow molding

Structure and synthesis

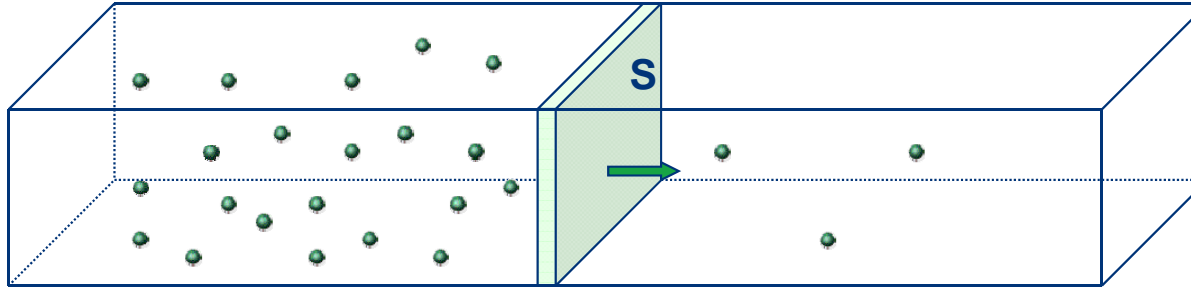
EVOH = Ethylene – Vinyl Alcohol Copolymer



Synthesis : EVA saponification

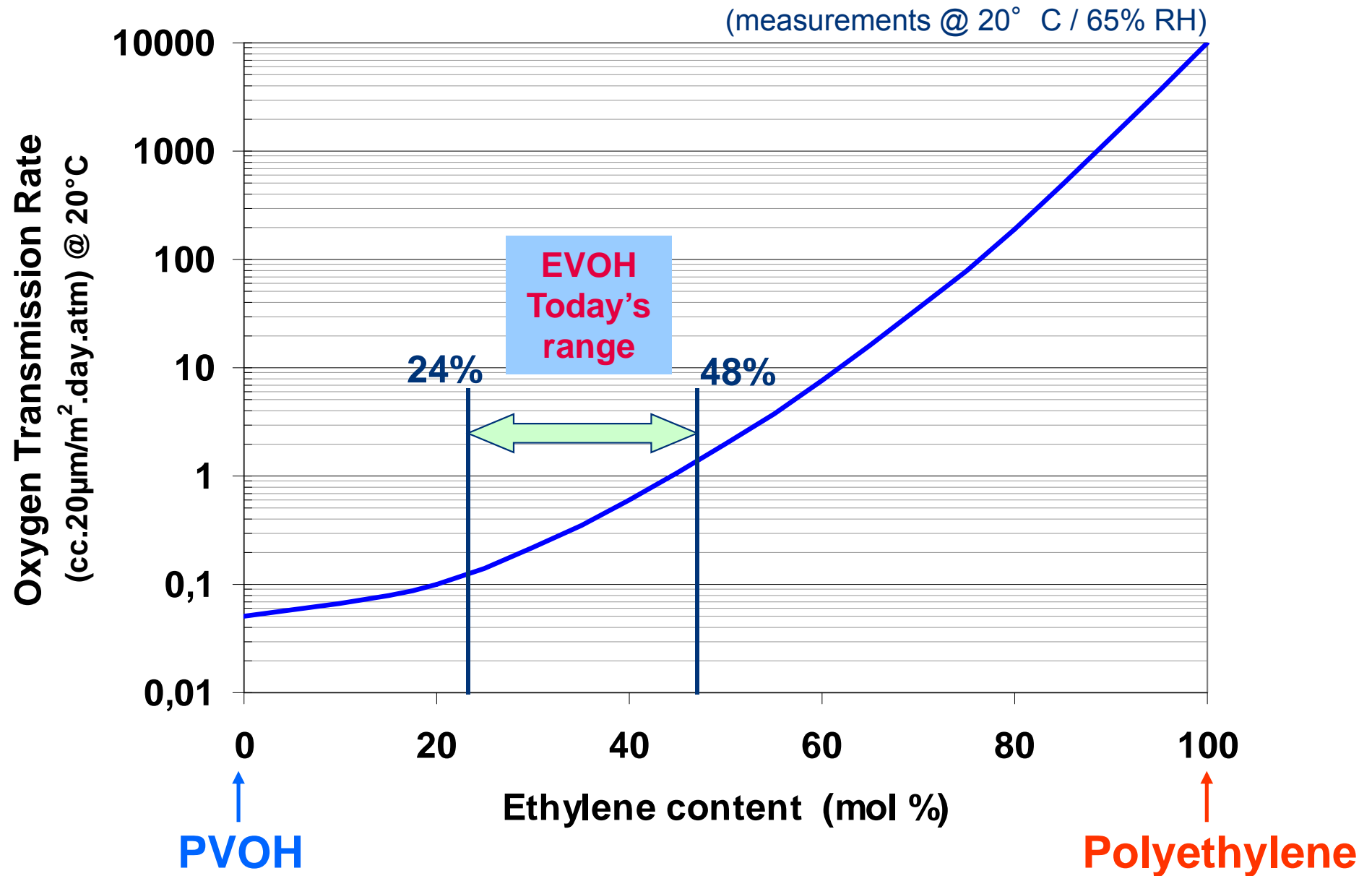


Permeation rate... what?

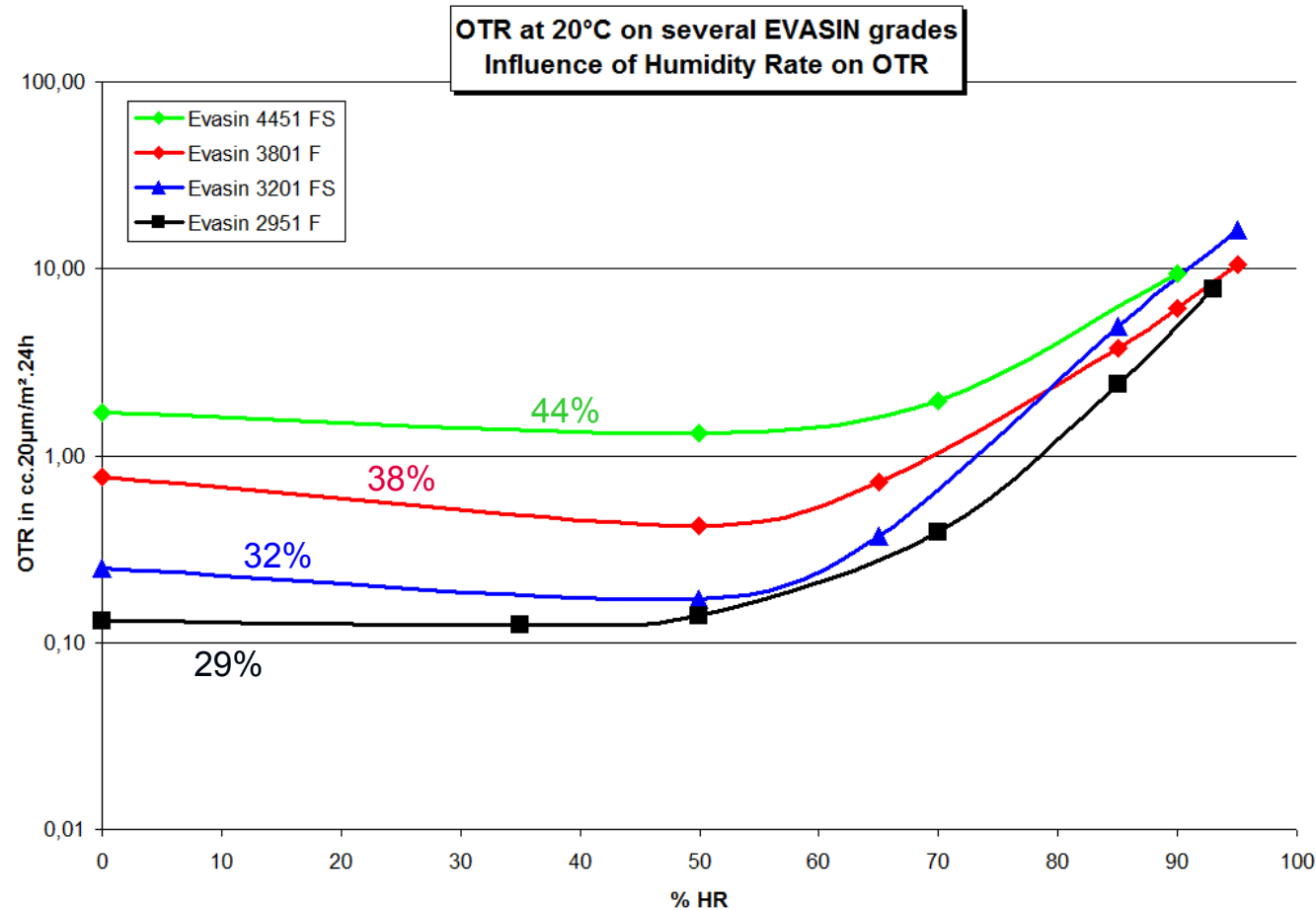


- **Definition** : Permeation Rate = amount of fluid going through the thickness of a material along a surface S and during a given time
- **Unit** : P expressed in « fluid weight or volume . film thickness/m². day.atm »
Example : PO₂ Evasin EV3201-V @ 20° C and 65% RH : 0,63 cc.20µm/m².day.atm
- Permeation is influenced by :
 - Thickness → Example : $P_{25\mu\text{m}} = 20 \times P_{20\mu\text{m}} / 25$
 - Temperature : P ↗ with Temperature
 - Moisture content (ex : case for EVOH, not for Polyethylene...)
 - Fluid type (solubility factor in the media)

Influence of Ethylene content on permeation



Moisture content effect on O2 permeation

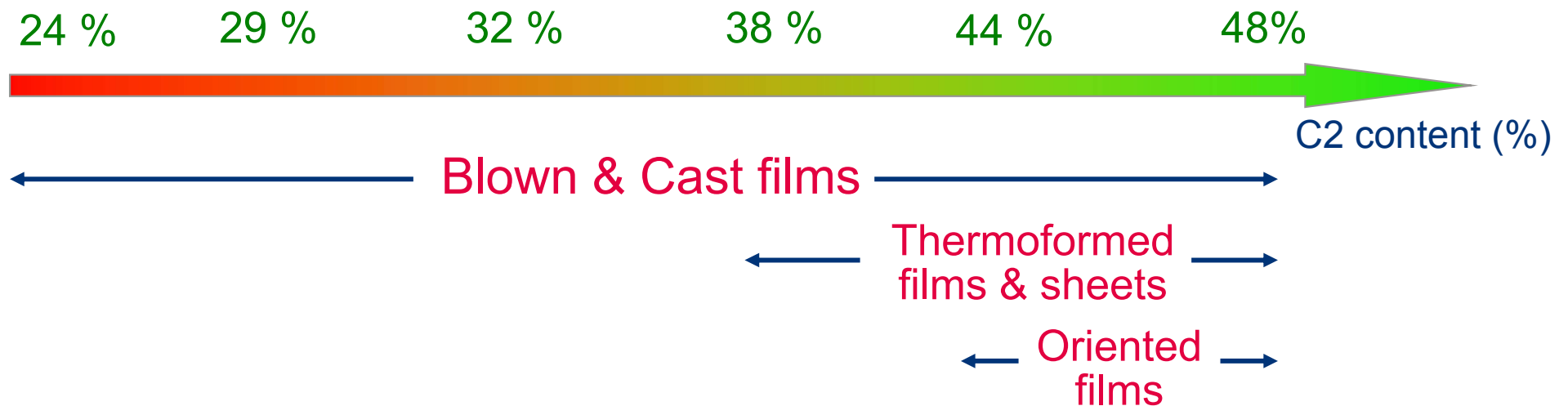


- EVOH barrier level very high compared to PA6 (x10 to x100)
- Barrier ↘ when RH % increase
- Barrier decrease when C2 content increase excepted for very high RH level (> 90%)

↳ What is the usual RH range of the EVOH layer in a food packaging structure?

Influence of EVOH Ethylene content: processability

- Thermal stability : ↗ with ethylene content
high ethylene content grades are easier to process
- Formability : ↗ with ethylene content
low ethylene grades not suitable for bi-orientation & thermoforming



EVASIN Nomenclature

E	V	-	3	2	0	1	F
EVOH	Ethylene content (%)		01: Standard grade 51: Stabilized grade		F: with Lubricant V: Virgin Resin		

→ Lubricated (F) or not lubricated (V)?

➤ Lubricant is aimed at easing the screw feeding

- Ensure a continuous feeding and a stable output
- Reduce the torque
- It has no side effect
- Most market is covered with lubricated grades

→ -51 grades?

➤ Thermally stabilized grades were designed in order to:

- avoid gels formation during long production runs
- Allow higher extrusion temperatures (coex with PET...)
- No change in terms of final properties

Orevac tie layer product range

Tie layer for coextrusion with PE, EVA, PS, EVOH, PA

	Base	Melt index (g/10min) 190° C-2,16kg	Melting point (° C)	Vicat (° C)	Comments	Comments
Orevac 18360	LLDPE	2.0	125	110	EVOH, PA	Ready-to use
Orevac 18302N	LLDPE	1.5	123	84	EVOH, PA	Ready-to use
Orevac 18300	LLDPE	2.3	120	80	EVOH, PA	Ready-to use
Orevac OE825	LLDPE	3.0	118	99	EVOH, PA	Concentrate
Orevac 18211	EVA	3.5	75	51	EVOH, PA, PS	Ready-to use
Orevac 18910	LLDPE	1.5	117	77	PS/EVOH/PE	Ready-to use

Tie layer for coextrusion with PP, EVOH, PA

	Base	Melt index (g/10min) 230° C-2,16kg	Melting point (° C)	Vicat (° C)		Comments
Orevac 18722	PP	7	143	120	Blown&cast	Ready-to use
Orevac 18729	PP	4.5	162	137	Cast	Ready-to use

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