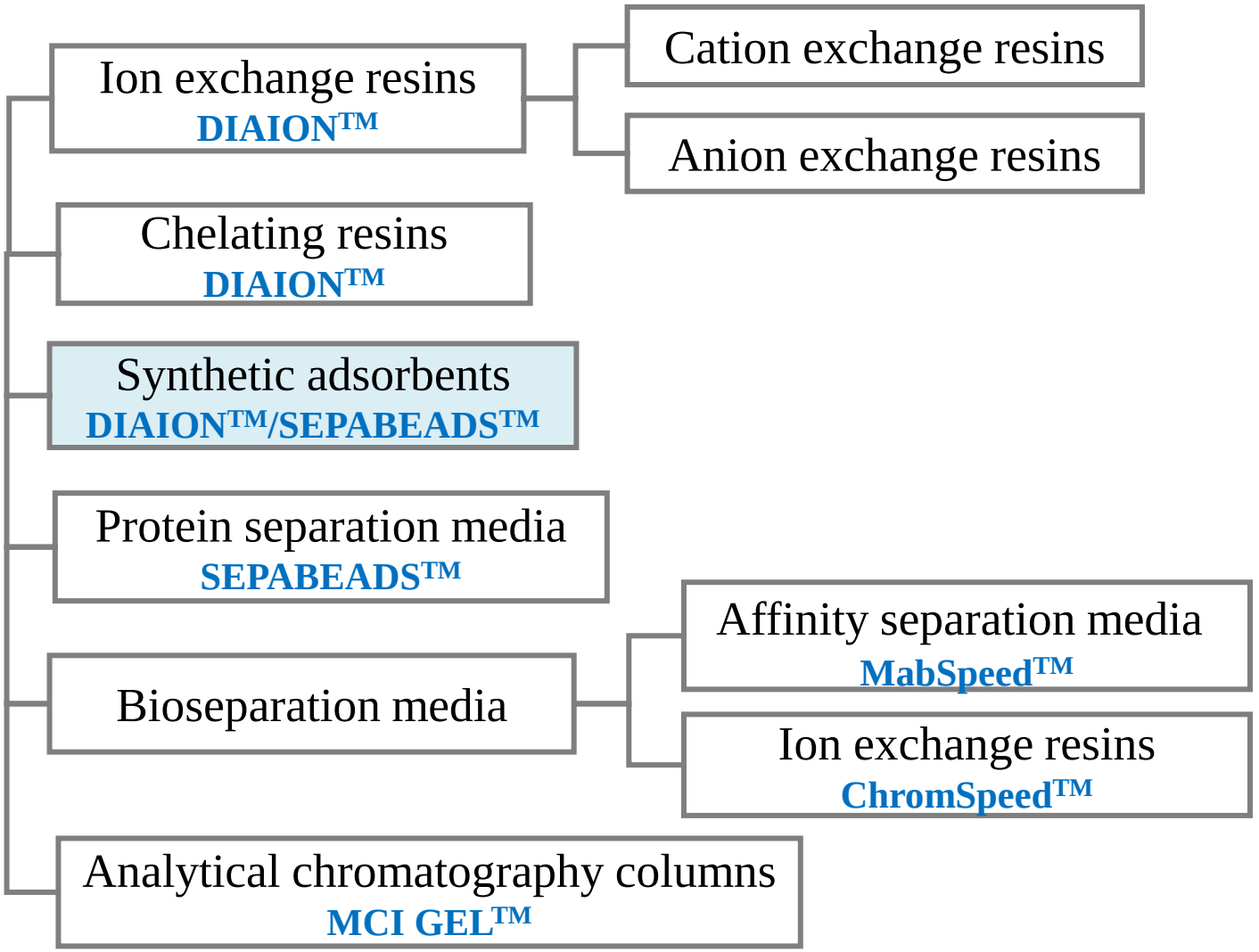
Purification of Omega3 EPA-Et with synthetic adsorbents

Mitsubishi Chemical Corporation
Separation Materials Department

Content

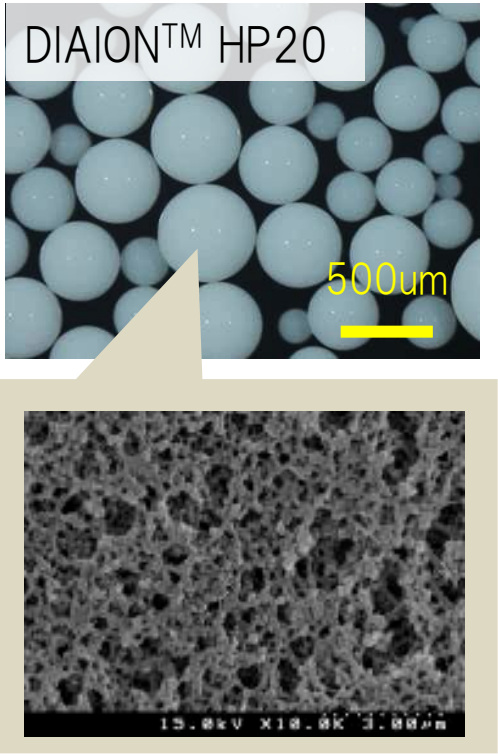
- Introduction of synthetic adsorbents
- Study results of EPA-Et purification

Products line



Synthetic adsorbents

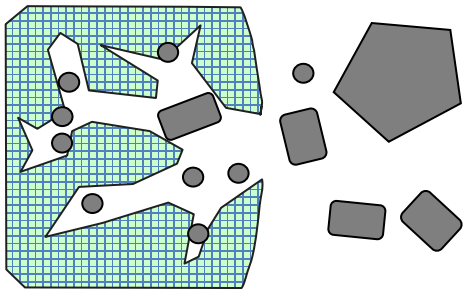
Synthetic adsorbents:
spherical crosslinked polymer particles
that have porous structure



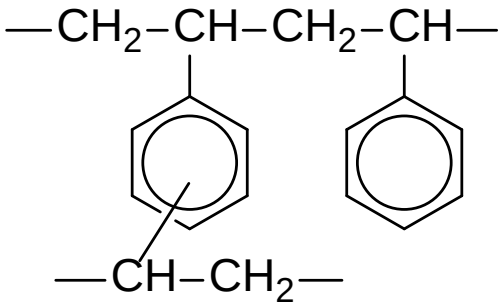
Polystyrene/divinylbenzene matrix
No Ion excahange functional group
Pore size; 10 - 1,000 Å

Hydrophobic interaction

Size exclusion



High chemical stability (pH 1-14 available)



Applications

Debittering of citrus juice

Synthetic adsorbents

Omega 3 (EPA-Et)

Green tea catechin

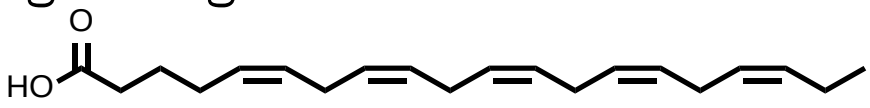
Stevia sweetener

Isoflavone

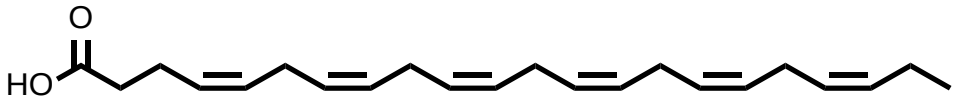
Polyphenol

Omega-3

Omega-3 are polyunsaturated fatty acids.
Existing in fish oil extracted from Scombridae, Clupeidae, and Salmonidae families.
Omega-3 are essential nutrients in human diet and are linked to a growing number of health benefits.

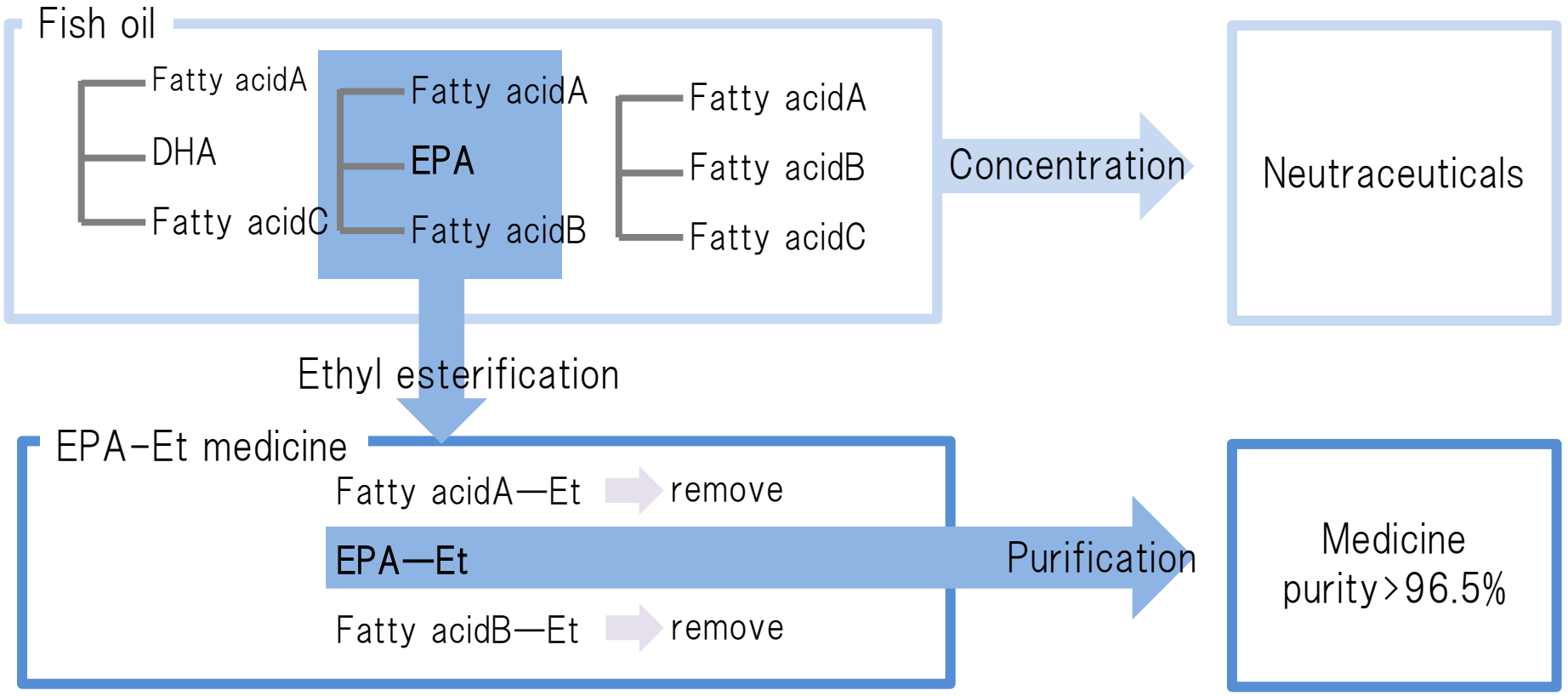


EPA(eicosapentaenoic acid)
Chemical Formula: $C_{20}H_{30}O_2$
Molecular Weight: 302.46



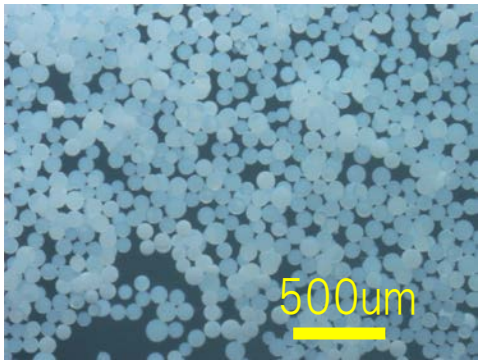
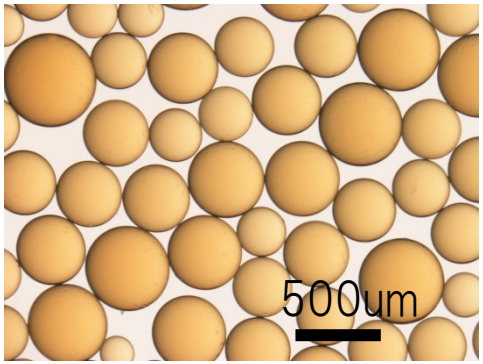
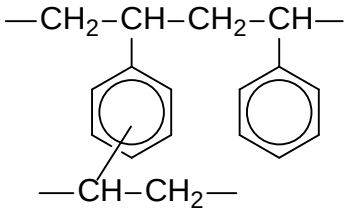
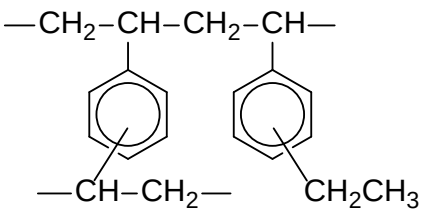
DHA(docosahexaenoic acid)
Chemical Formula: $C_{22}H_{32}O_2$
Molecular Weight: 328.50

Flowchart of EPA-Et purification



Synthetic adsorbents and ODS are used for purification.

MCC synthetic adsorbents product line-up

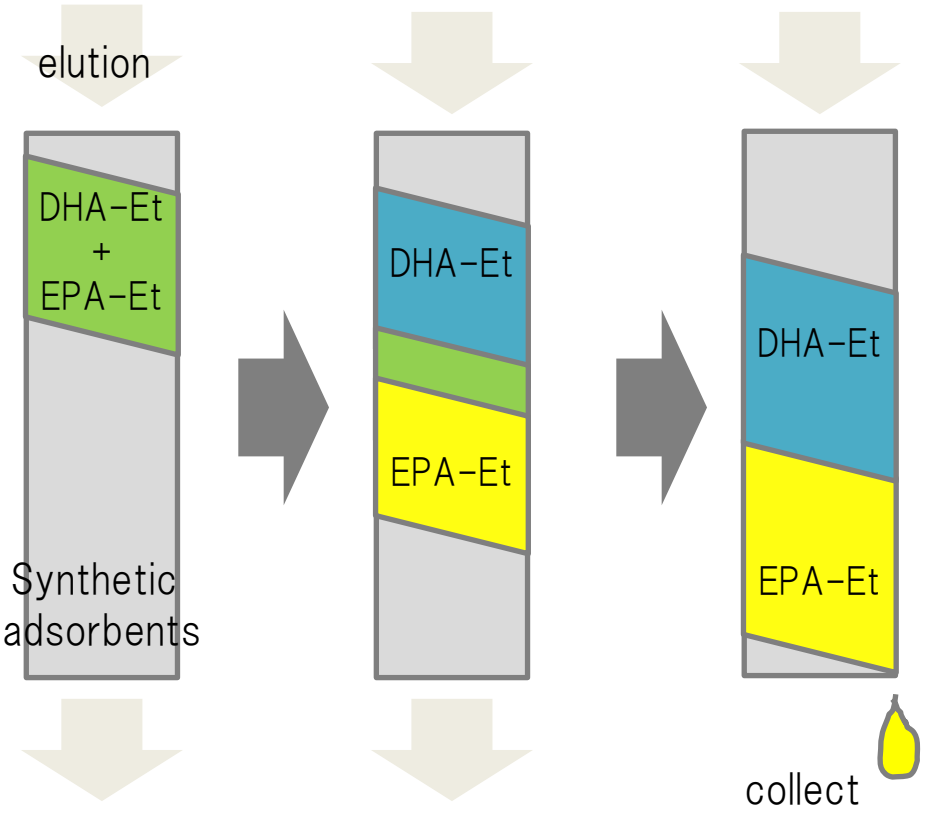
	HP20SS	SP700
appearance		
Structure		
Ave. particle size(μm)	90*	460*
Peak pore radius (Å)	290*	90*
Surface area(m^2/g)	560*	1100 以上
Pore amount(mL/g)	1.2*	2.2*

*referential data

Examples of chromatographic separation process for EPA-EE using synthetic adsorbents

Fish oil(make-up);
DHA-Et 30wt%
EPA-Et 70wt%

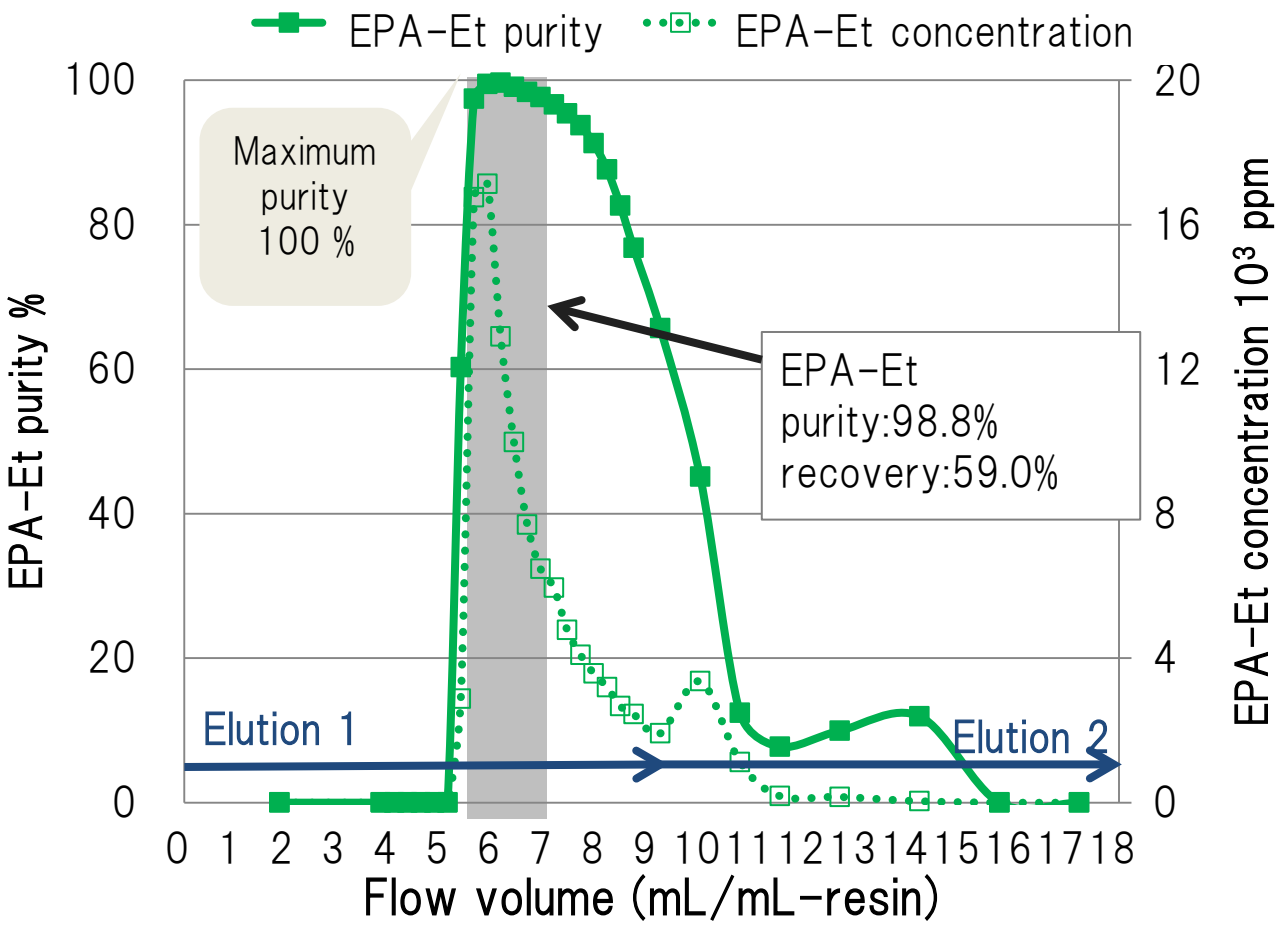
Elution; 90% MeOH水溶液
Load; 40g/L-resin

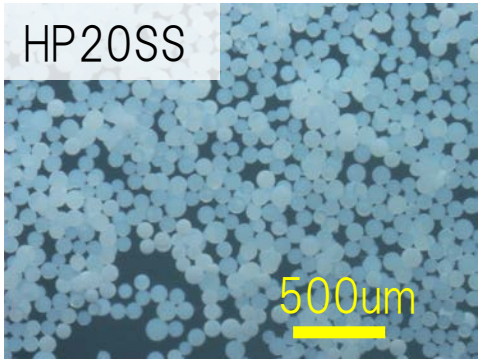


EPA-Et purity >96.5%

Japanese Pharmacopoeia, more than 96.5% purity is needed for EPA-EE to be used as prescription medicine.

Results of HP20SS

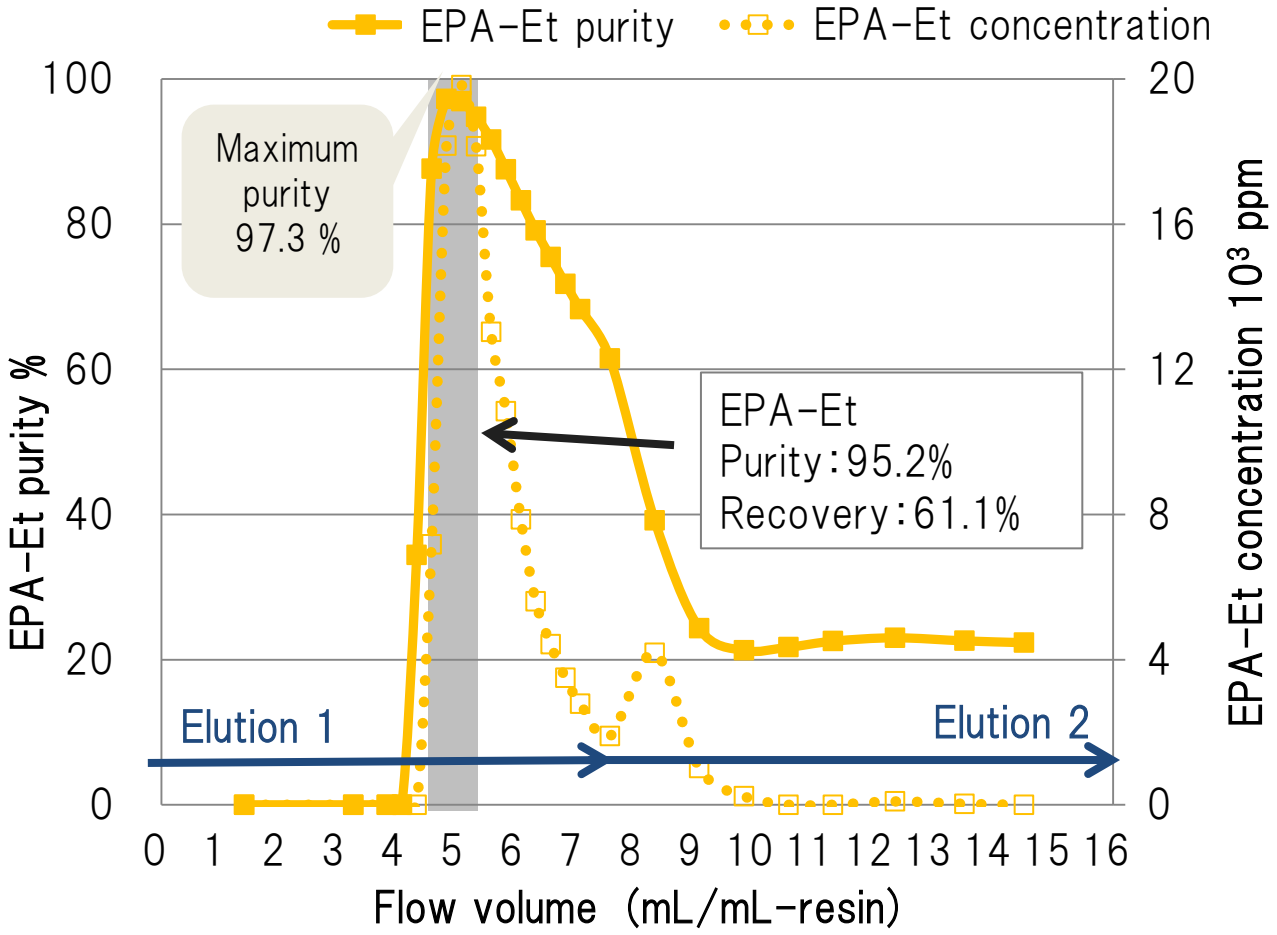


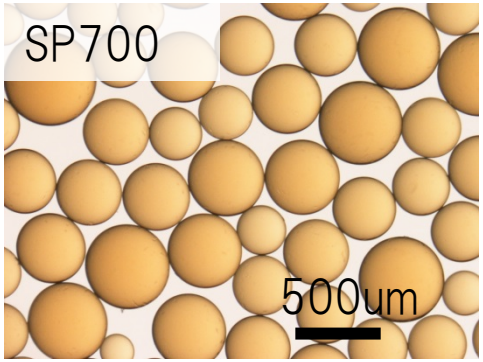


Condition:
- Resin; 40 mL
- Column; L 520 mm x 10 mm I.D.
- Height of resin; 520 mm
- Temperature; 40°C
- Elusion;
  Elution 1 90%MeOH SV1
  Elution 2 100%MeOH SV3

High purity ≥ 96.5% & High recovery

Results of SP700

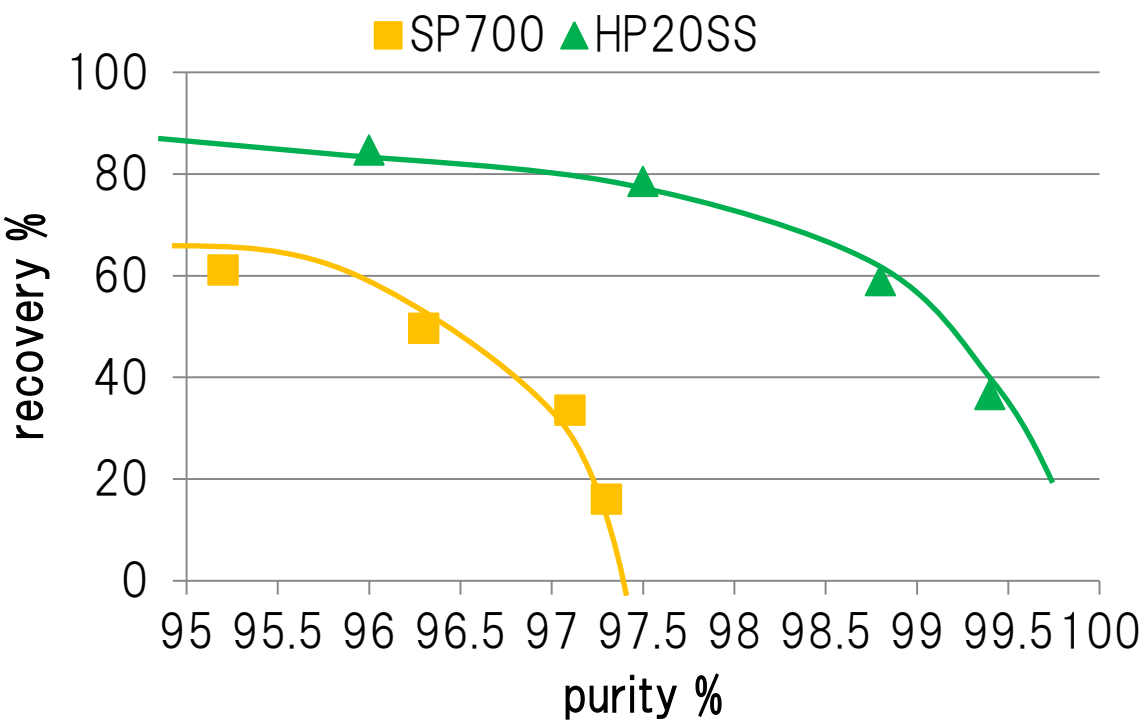


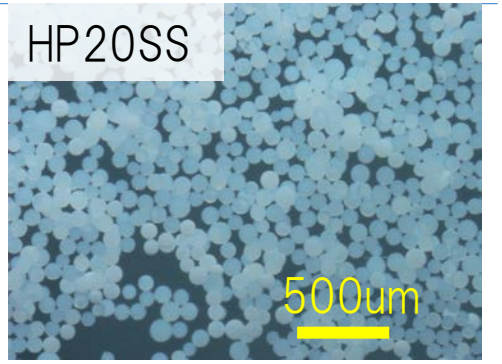


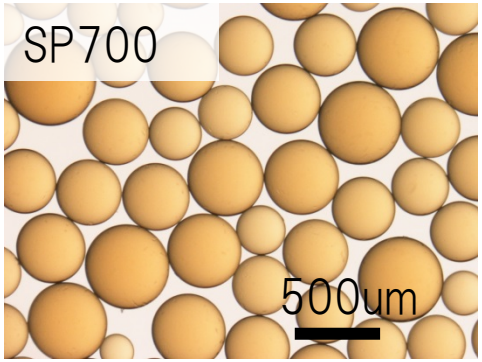
Condition:
- Resin; 180 mL
- Column; L 1030 mm x 15 mm I.D.
- Height of resin; 1030 mm
- Temperature; 40°C
- Elusion;
  Elution 1 90%MeOH SV1
  Elution 2 100%MeOH SV3

High purity ≥ 96.5% & High recovery

Purity and recovery







Synthetic adsorbents can separate EPA-EE with more than 98.5% purity. Choice the most suitable synthetic adsorbent for your process.

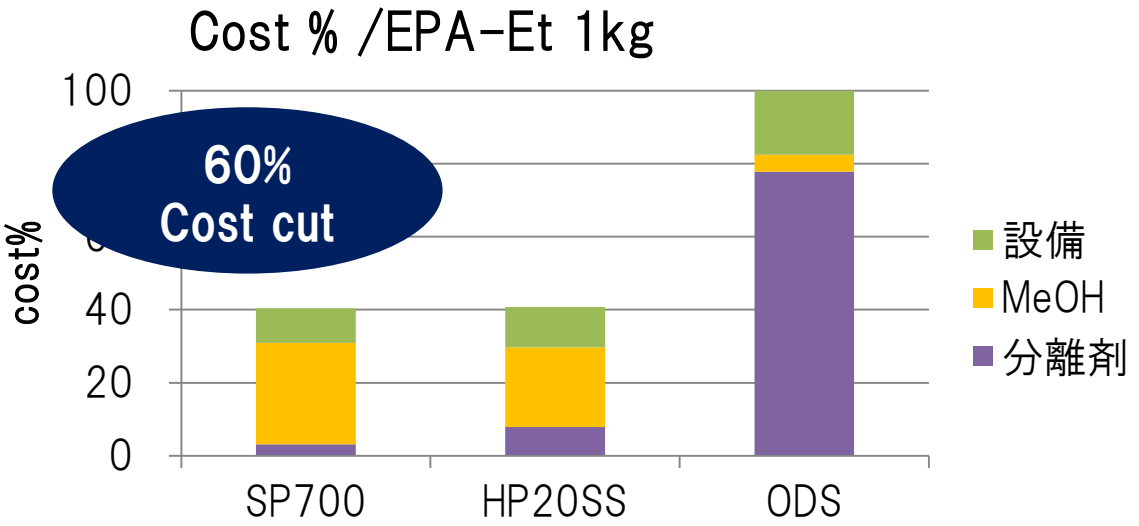
Purity →HP20SS
Easy use →SP700

Cost calculation(case; 10t/year production)

		SP700	HP20SS	ODS(10μm)
Purity	%	96.5	96.5	96.5
Recovery	%	50	82	85
Load	g/L-R	40	40	60
Cycle	cycle/day	2	2	12
Volume of resins	m3/cycle	1.3	0.8	0.1
Volume of MeOH	m3/cycle	8.8	6.9	0.3
Resins	—	¥	¥¥	¥¥¥
Equipment	—	¥	¥¥	¥¥¥
Cost%	%	40	41	100

Production cost can be reduced significantly by use of synthetic adsorbents

MeOH:@10 yen /L
Life:500cycle



Conclusion

○synthetic adsorbents show good performance for EPA-EE purification and enable high purity and recovery

EPA-Et purity ≥96.5%,

○it is very important to choose the most suitable synthetic adsorbent for your process.

Purity →HP20SS

Easy use →SP700

○Production cost can be reduced significantly by use of synthetic adsorbents