

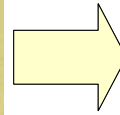
Introduction of Hyper-coal



= Dried and low ash coal

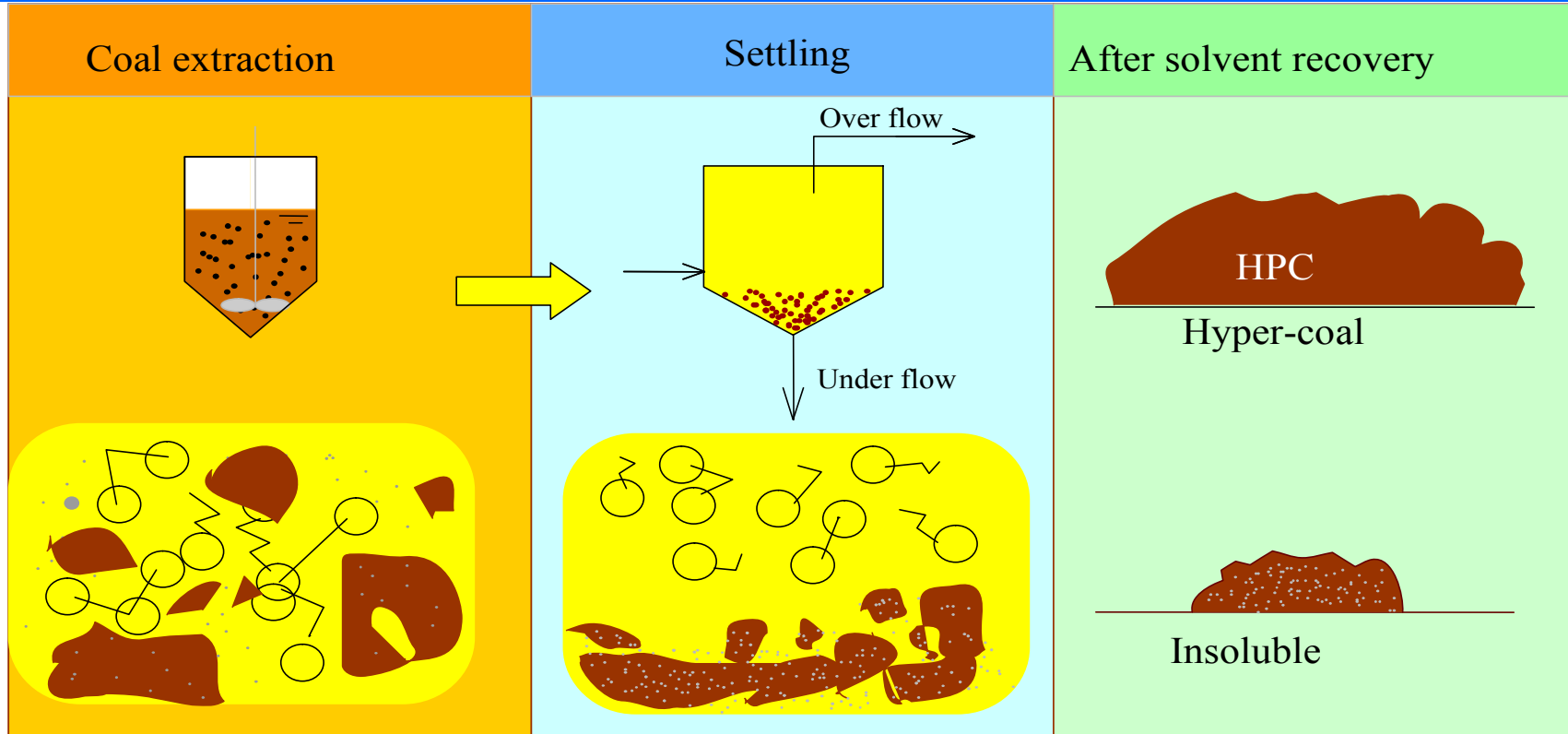


1kg of a black coal and fly ash



1kg of HPC and fly ash

Process concept



Coal extraction

The molecular associations are thermally loosened and molecules are dissolved into solvent.

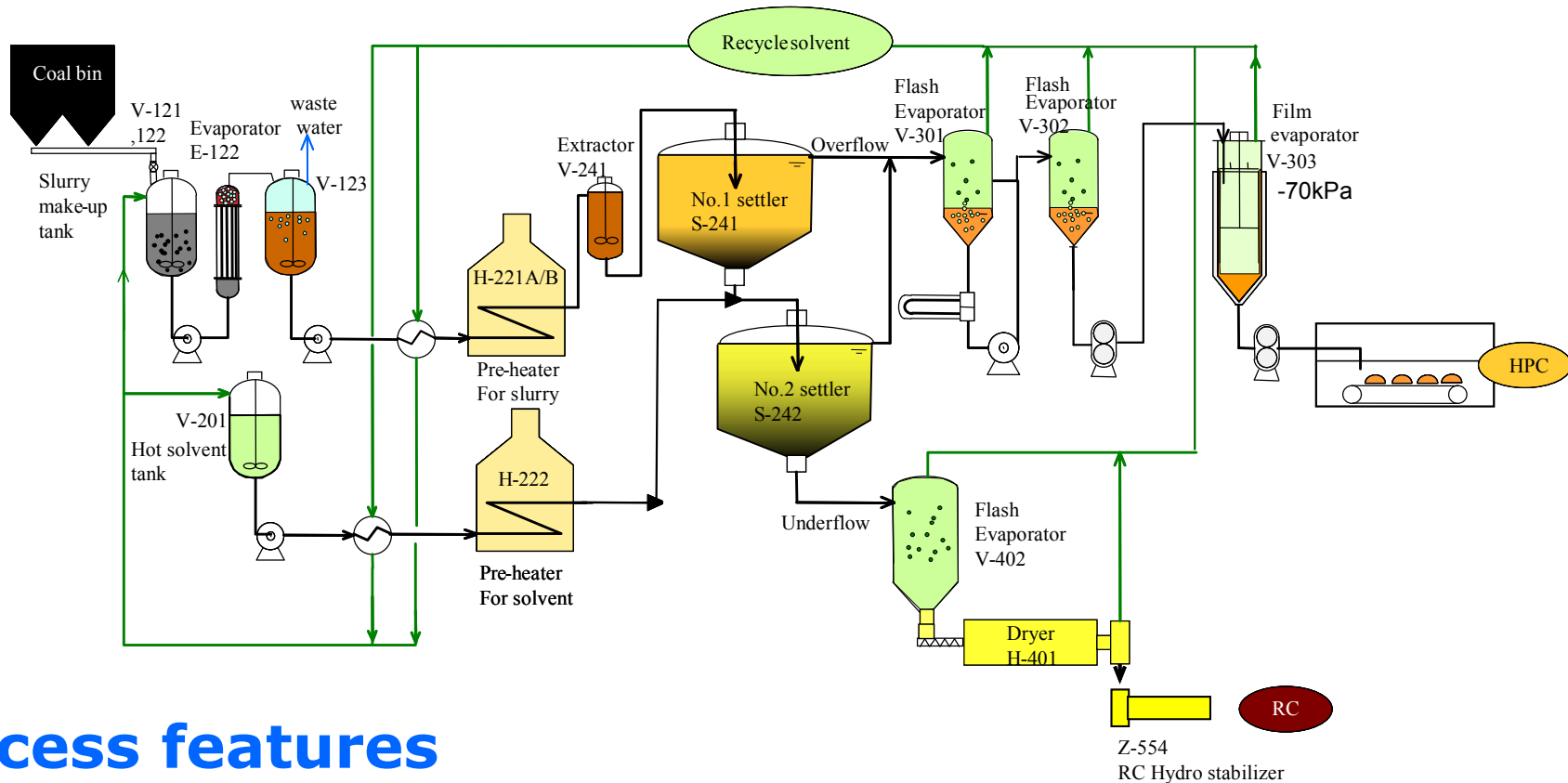
Settling (Liquid-Solid Separation)

The solids (ash and insoluble molecules) are settled by gravity in the liquid (solution).

Solvent recovery and recycling

Hyper-coal (solution) and insoluble coal (residue) are obtained after vaporizing the solvent. Recovered solvent is recycled in the process.

Process outline



Process features

Solvent recycling
Coal derived
2-ring aromatics

Non use of hydrogen

Simple process & mild conditions
<2MPa, <400 °C

Coal-derivative distillate fractions, mainly methyl naphthalene like compounds, are used for the process solvent. It can be completely recycled in the process.

Hydrogen is an effective material to up-grade low rank coals, but it causes not only to highly plant cost, but also to highly operation cost. Hyper-coal process never uses hydrogen. It brings a simple plant apparatus, mild operation conditions, stable operations and high energy efficiency.

Products features

Ultimate and Proximate analysis

Coal	Product	ash	VM	C	H	N	S	O _{diff.}	Fuel ratio	Heat value
		[wt%]db	[wt%]	[wt%] (daf basis)					[kcal/kg] gross	
Bituminous (Steaming)	MO Raw coal	12.2	41.3	82.9	5.5	2.0	0.6	9.1	1.4	6920
	HPC	<1	44.7	84.9	5.5	1.8	0.6	7.2	1.2	8630
	RC	20.4	27.9	82.8	4.3	2.0	0.7	10.2	2.6	6060
	XS Raw coal	11.4	35.9	80.9	5.5	1.9	0.6	11.1	1.8	7230
	HPC	<1	52.9	86.6	5.9	1.7	0.6	5.1	0.9	8550
	RC	18.8	30.1	82.5	4.5	2.3	0.7	10.0	2.3	6580

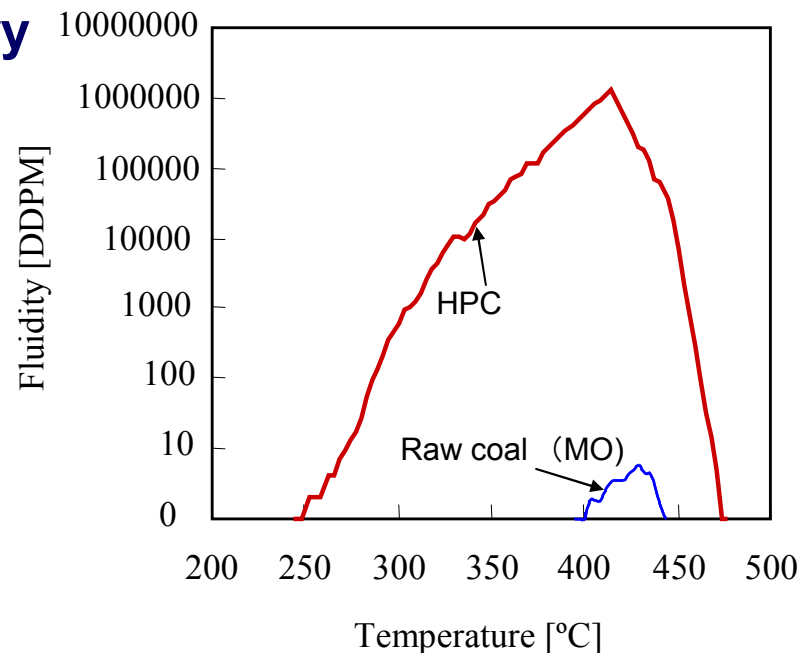
Hyper-coal (HPC)

Dried and low ash (<1-2%)
 High heat value (>8500kcal/kg)
 Excellent thermo plasticity
 High storage stability
 High briquetability

Residual coal (RC)

Residual coal (RC) has high combustibility and high heat value even though the ash is concentrated.

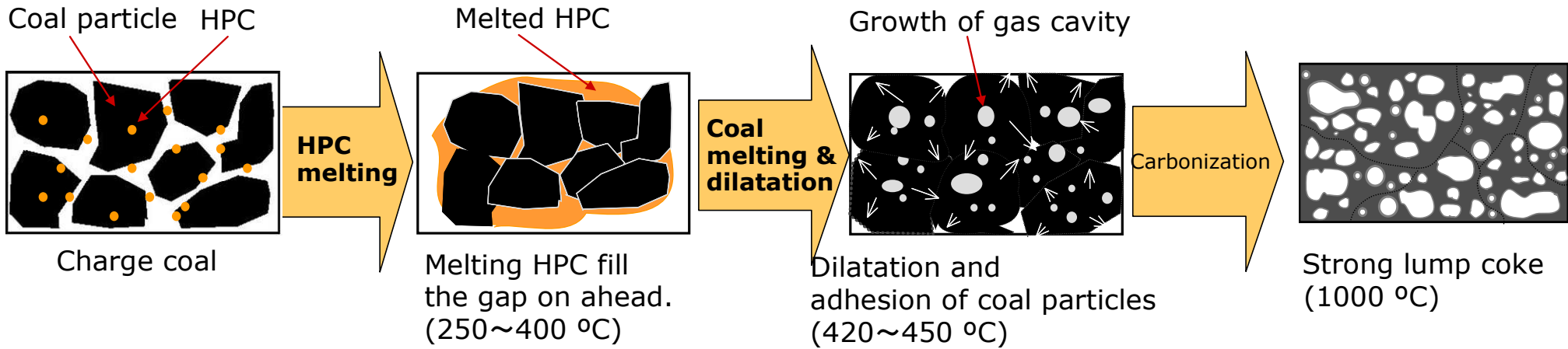
Gieseler plastometry



Thermoplasticity is the most important characteristics for coke strength.

Hyper-coal appeals an excellent thermoplasticity. Significant improvements in the thermoplasticity of coal blends are brought by addition of HPC.

Application as a caking additive

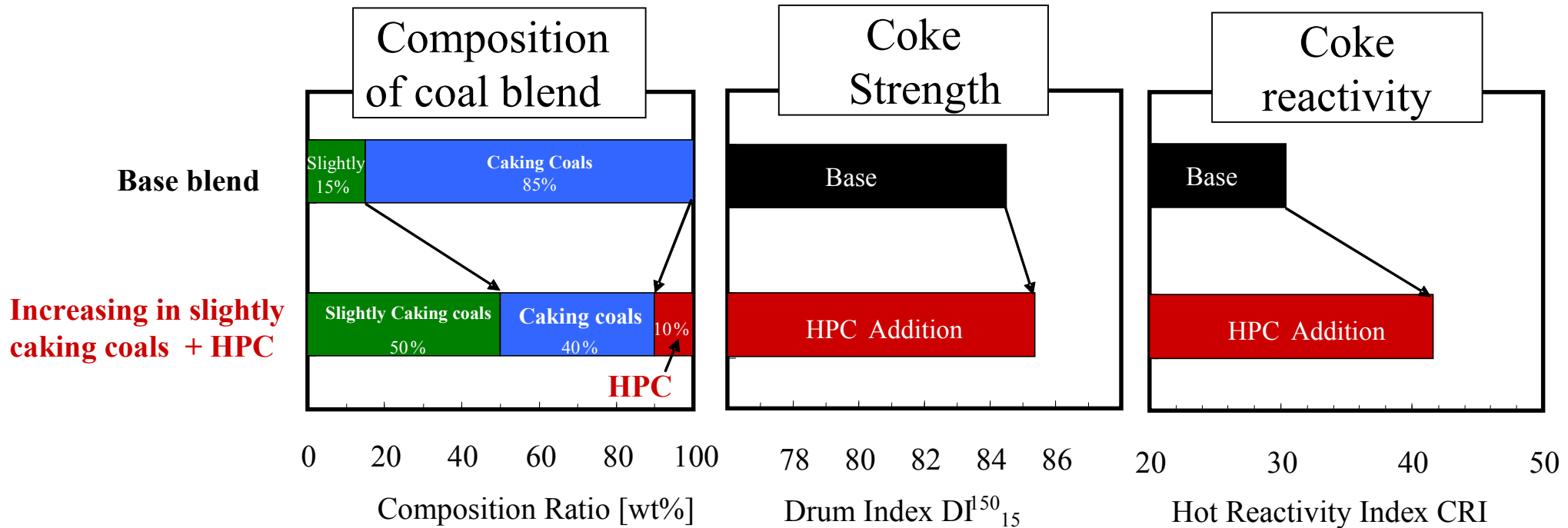


Melting HPC fill the inter particle voids on ahead of coking reactions.
It improves thermoplasticity and dilatation of coal blends to be a strong lump coke



300 kg of coke sample in scale by addition of HPC

Production of high strength and high reactive coke



Effect as a caking additive

Significant improvement in coke strength is observed by HPC addition, especially with high blending ratio of none or slightly caking coals.

It will bring not only for the cost merit, but also for the expansion in coal application to make blast furnace coke.