HAZRUNOFF PROJECT

Lessons learnt from accidents ECE incident

CEDRE

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Crash, leakage, accident

Where is the product?

Atmosphere
Sea surface
Water column

What is the risk?

What could be the impact?

Humans
Environment

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Plan

I. Parameters

II. Short-term

III. Long-term

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Parameters

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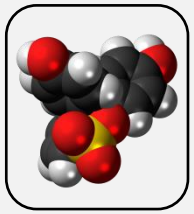
What can be found on a MSDS ?

physicochemical data

- Molecular weight
- Boiling point
- Fusion point
- Flash point
- Density
- Vapor pressure
- Solubility
- Viscosity



Phenol

CHEMICAL ID CARD

Laboratory

Ecotoxity data

- LC50 (fish, rats…)
- Threshold Limit Value (TLV)

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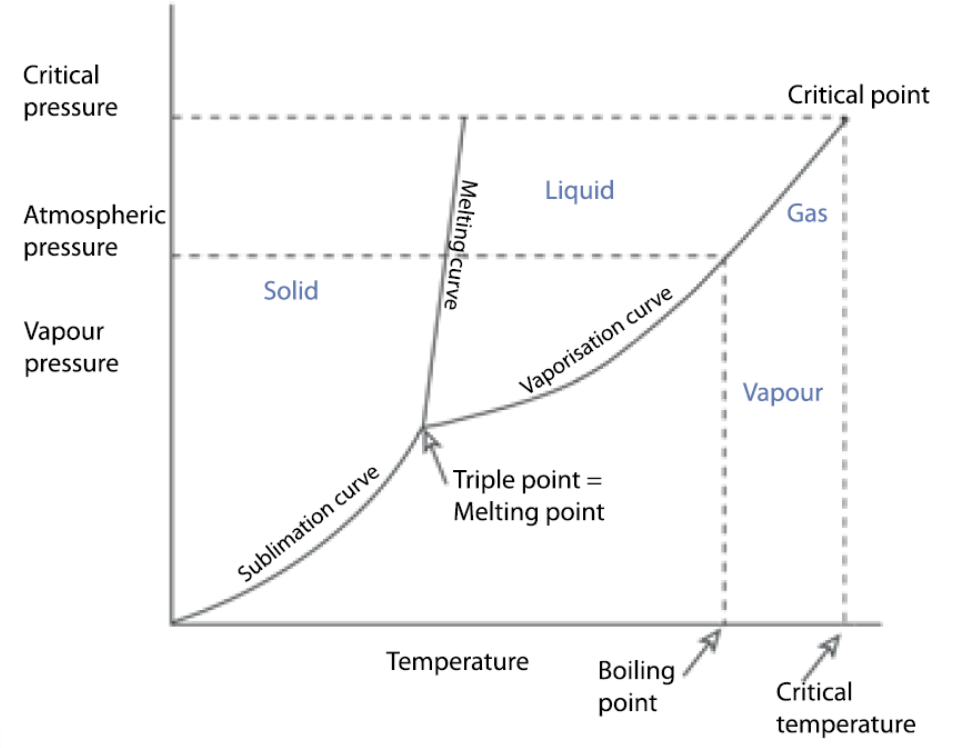
Chemicals states

3 states possible

- Gas
- Liquid
- Solid



HNS behavior will depend on

Transport condition

The environment

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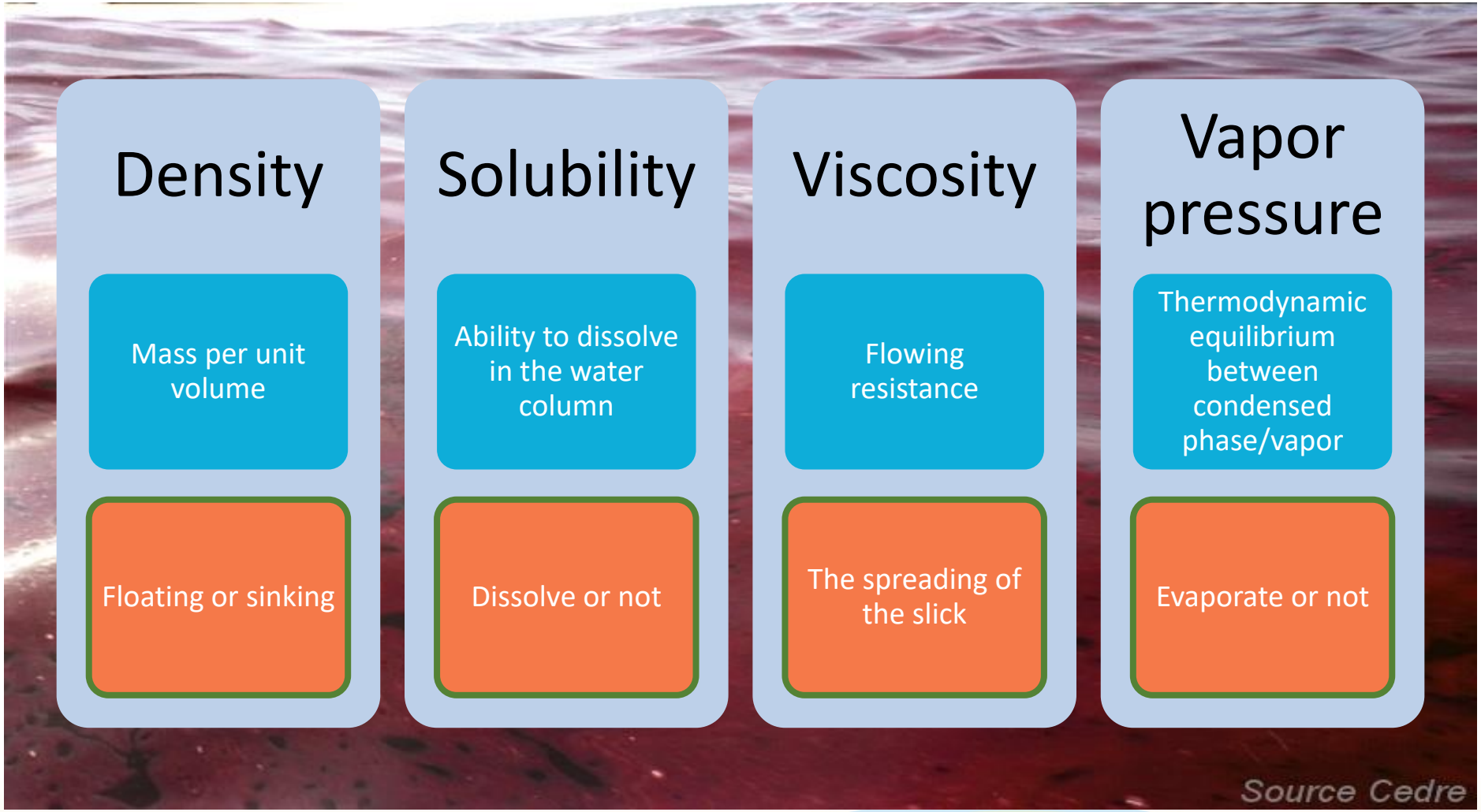
Physico-chemical properties



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Predicting a behavior

Marine Nationale

Accident → Immediately → First hours, days → After a week…

- **REACTIVITY**

State changes
Reaction with :
- Air
- Light
- Water
- Product

- **SHORT-TERM**

SEBC Code

- Physico-chemistry

- **LONG-TERM**

Physico-chemistry
and
Toxicity and
Environment

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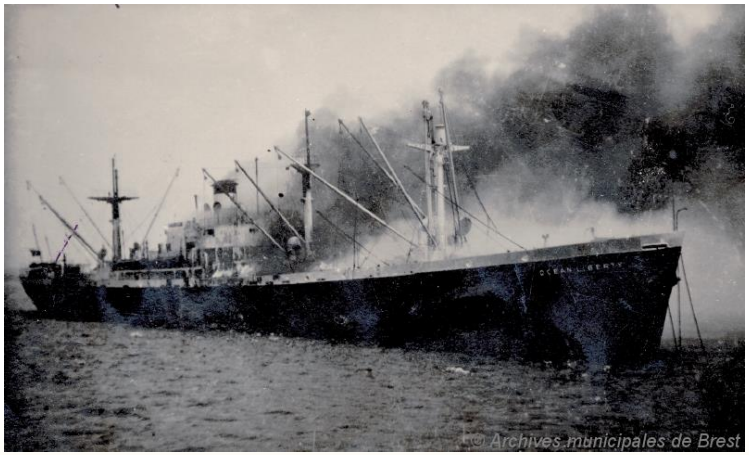
HNS reactivity

Fast transformation of the product → 4 main reactions

- With O2 from air
- With water
- With light
- Polymerization reaction



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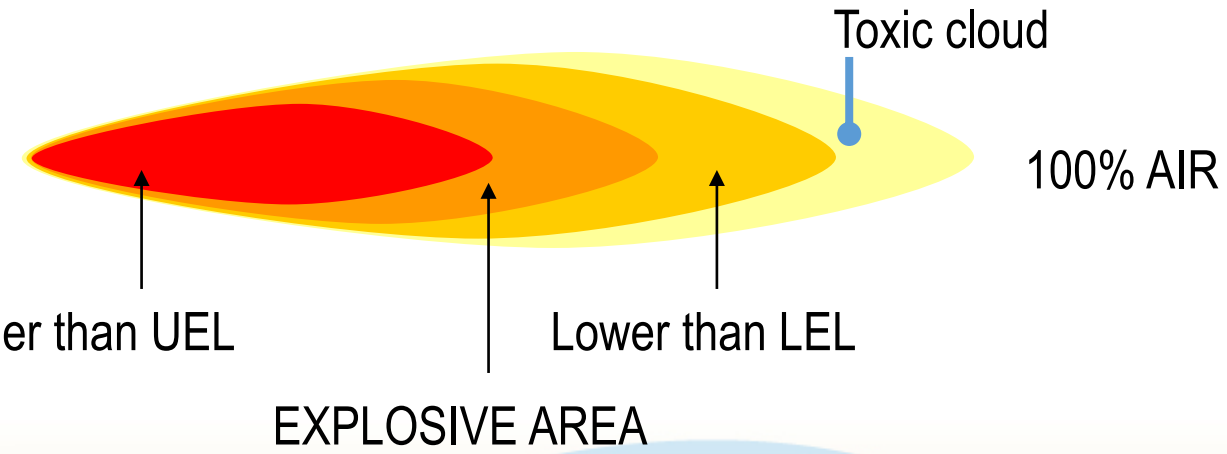
HNS reactivity

- With O2 from air
- With water
- With light
- Polimerization reaction

→ Fire/Explosion

Flammability limits :

- Lower explosive limit – LEL
- Upper explosive limit - UEL



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HNS reactivity

- With O2 from air
- With water
- With light
- Polimerization reaction

Hydrolysis →

- Exothermic reaction
- Corrosive product creation
- Flammable product creation

Ex : Chlorosulfonic acid

Ex : Na, K, Li produce flammable gas

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HNS reactivity

- With O2 from air
- With water
- With light
- Polimerization reaction

Chemical decomposition caused by light

T = several minutes to several months

Ex : N-nitrosoatrazine, Anthracene …

Creation of toxic and/or explosive compound

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HNS reactivity

- With O2 from air
- With water
- With light
- Polimerization reaction

Addition of inhibitors but polymerization can happen

- Contamination
- Contact with rust
- High temperature long exposure
- Static electricity
- Heat source

Monomer becomes unstable

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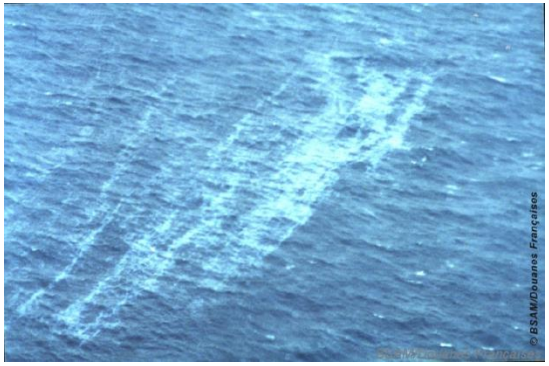
Influence of parameters - keypoints

Global behavior

- Depends on physico-chemical properties and environment
- Depends on time scale

Immediate behavior

- States changes
- Reactivity : Air – Water – Light – Polymerization



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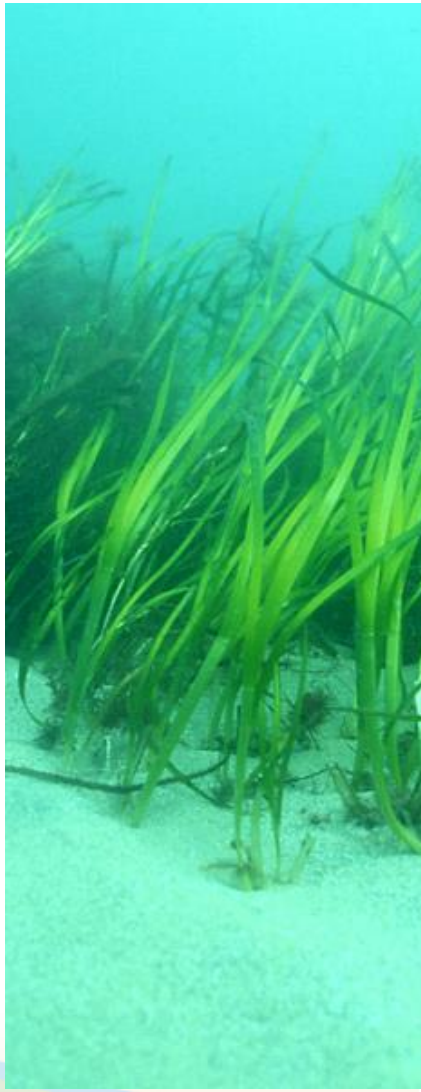
Chapter 2

Short-term behavior



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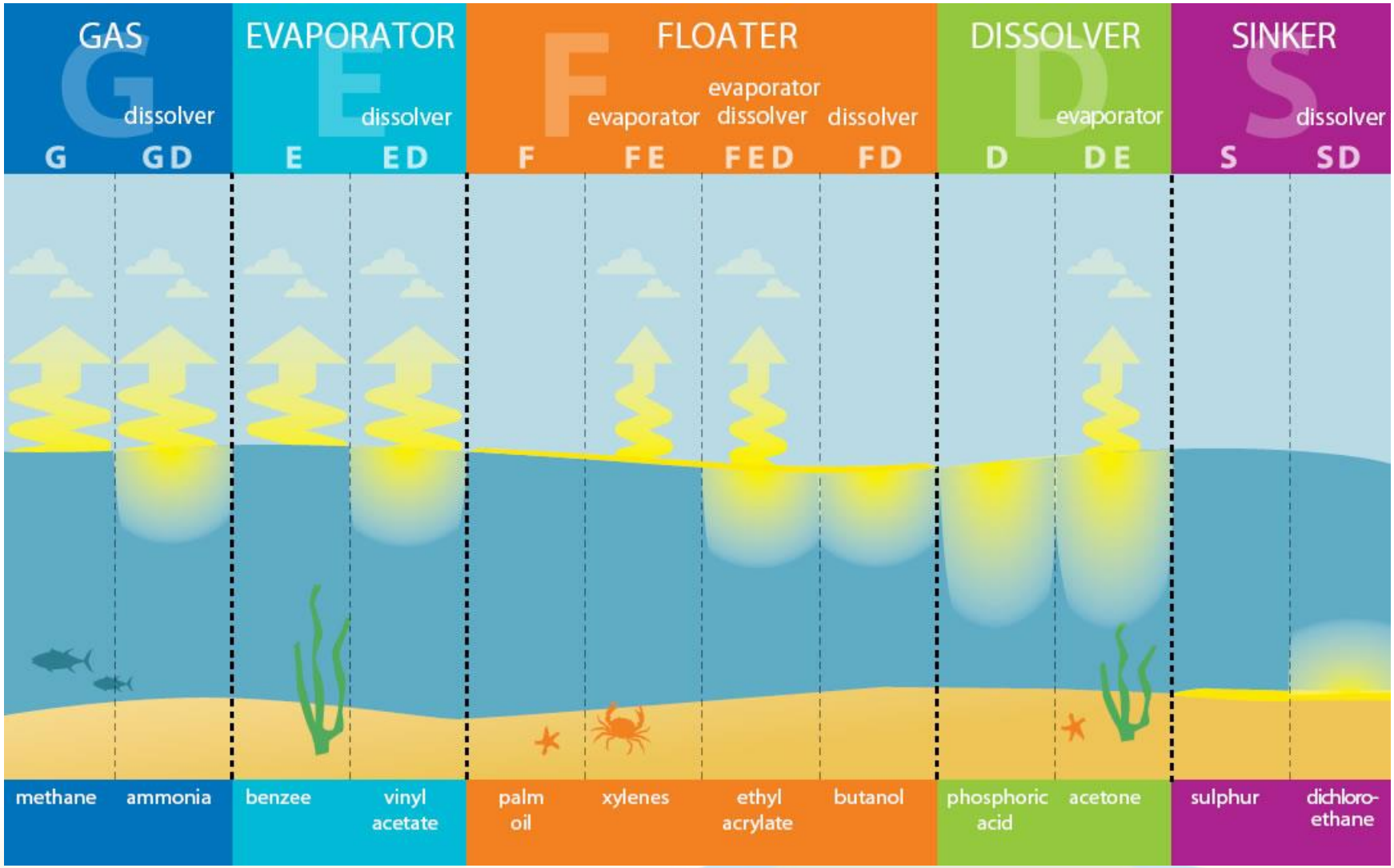
Behaviors classification



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Short term behavior - Thresholds

Vapor pressure

0,3 kPa — 100 kPa

Negligible | Fast evaporation | Gas

Density (/seawater)

− 1,03 +

Floater | Sinker

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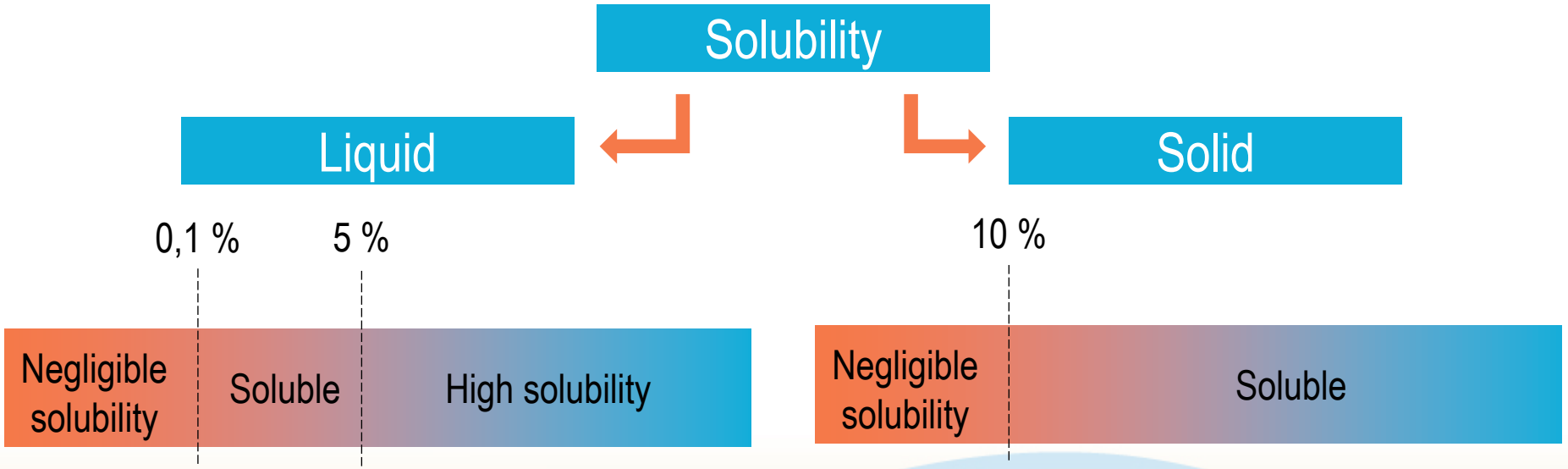
Short term behavior - Thresholds



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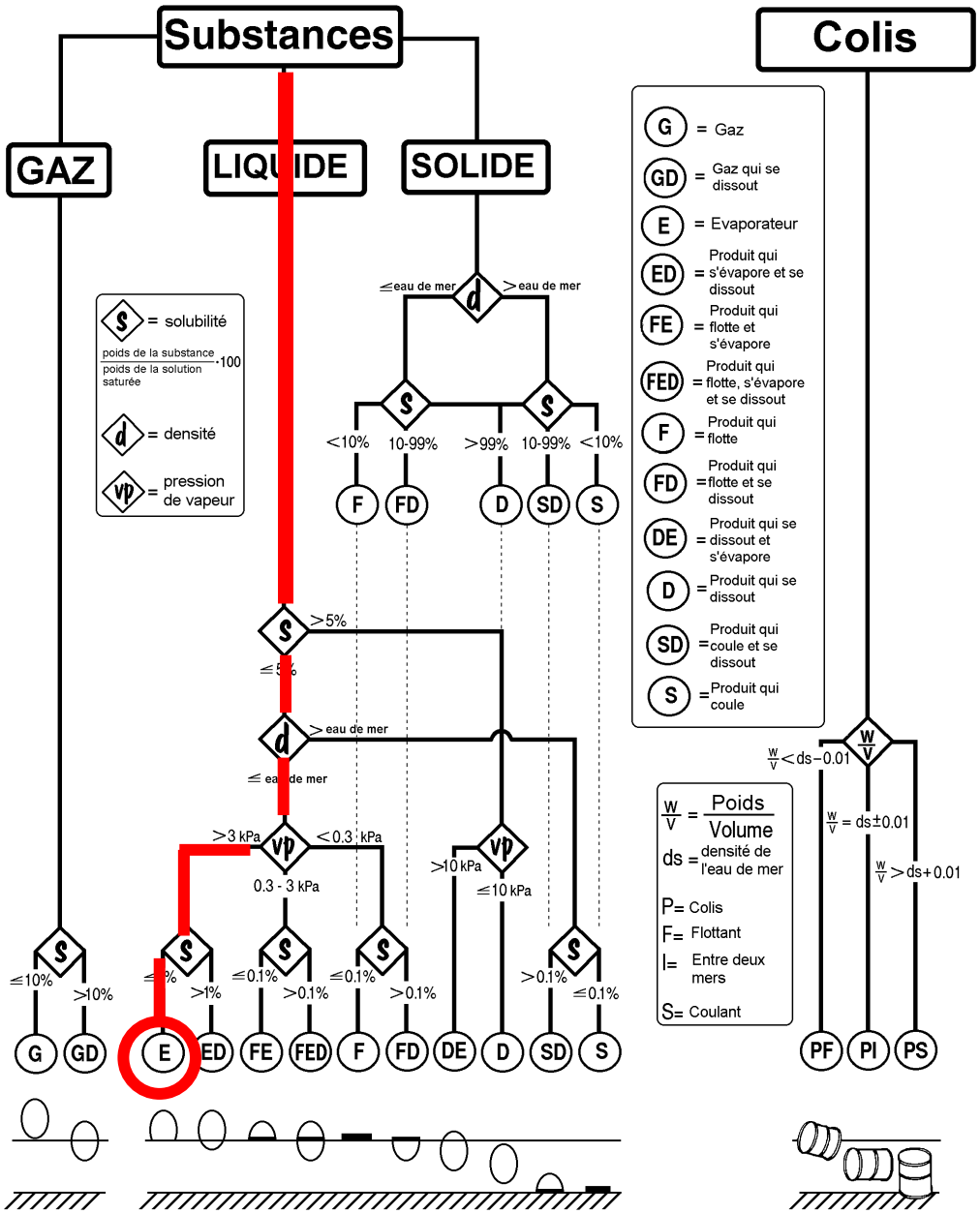
Legal representation : SEBC Code



HNS classification

Example : Benzene

Physical state and appearance: Liquid.

Solubility in freshwater: 1,780 mg/litre at 20° C
1,830 mg/litre at 25° C

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Evaporator

Limitation :

- Pure product
- In fresh water
- At 20°C

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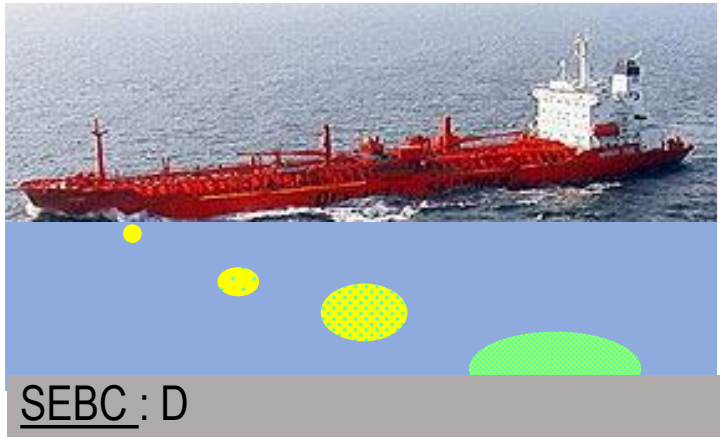
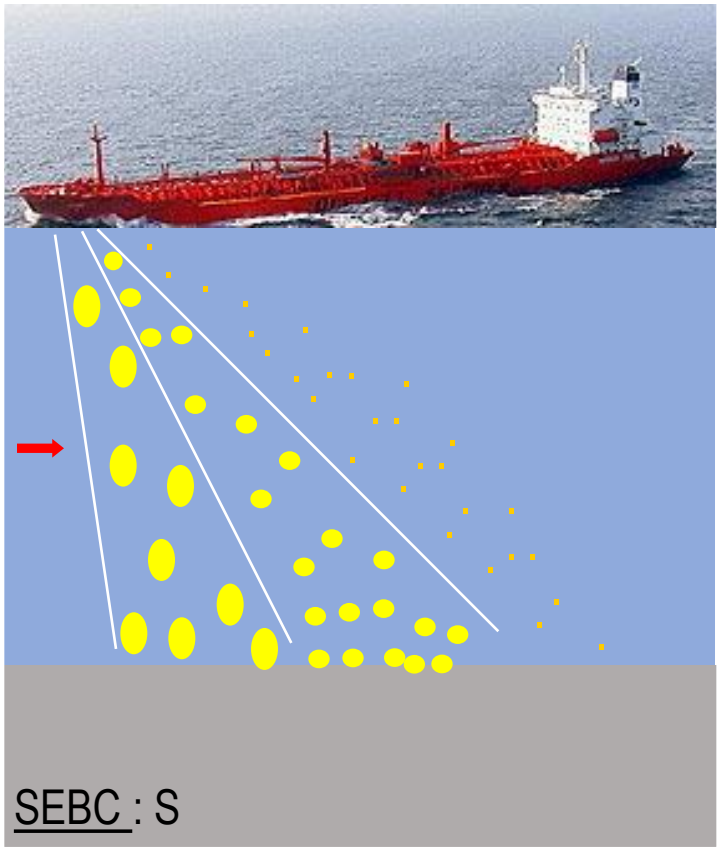
Limit of the SEBC Code

Methanol
solubility = 100%
density = 0.8



Sulfuric acid
solubility = 100%
density = 1.84



Dimethyldisulfure
Solubility: not soluble
Density: 1.063

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Short-term behavior - Keypoints

Behavior ?	→	5 main behaviors (G – E – F – D – S)
SEBC Code?	→	Based on : State - Vapor pressure – Solubility - Density
Limitation	→	Efficient tool, differences with reality

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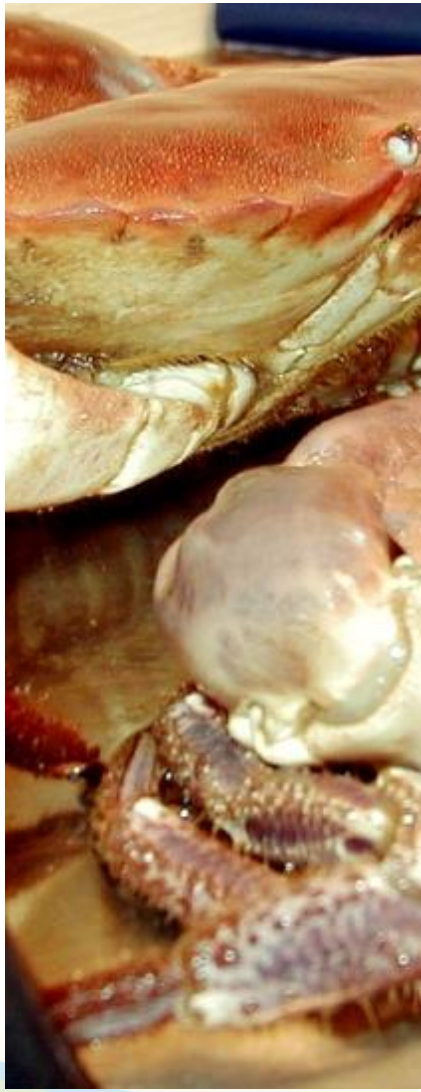
Chapter 3

Long-term behavior



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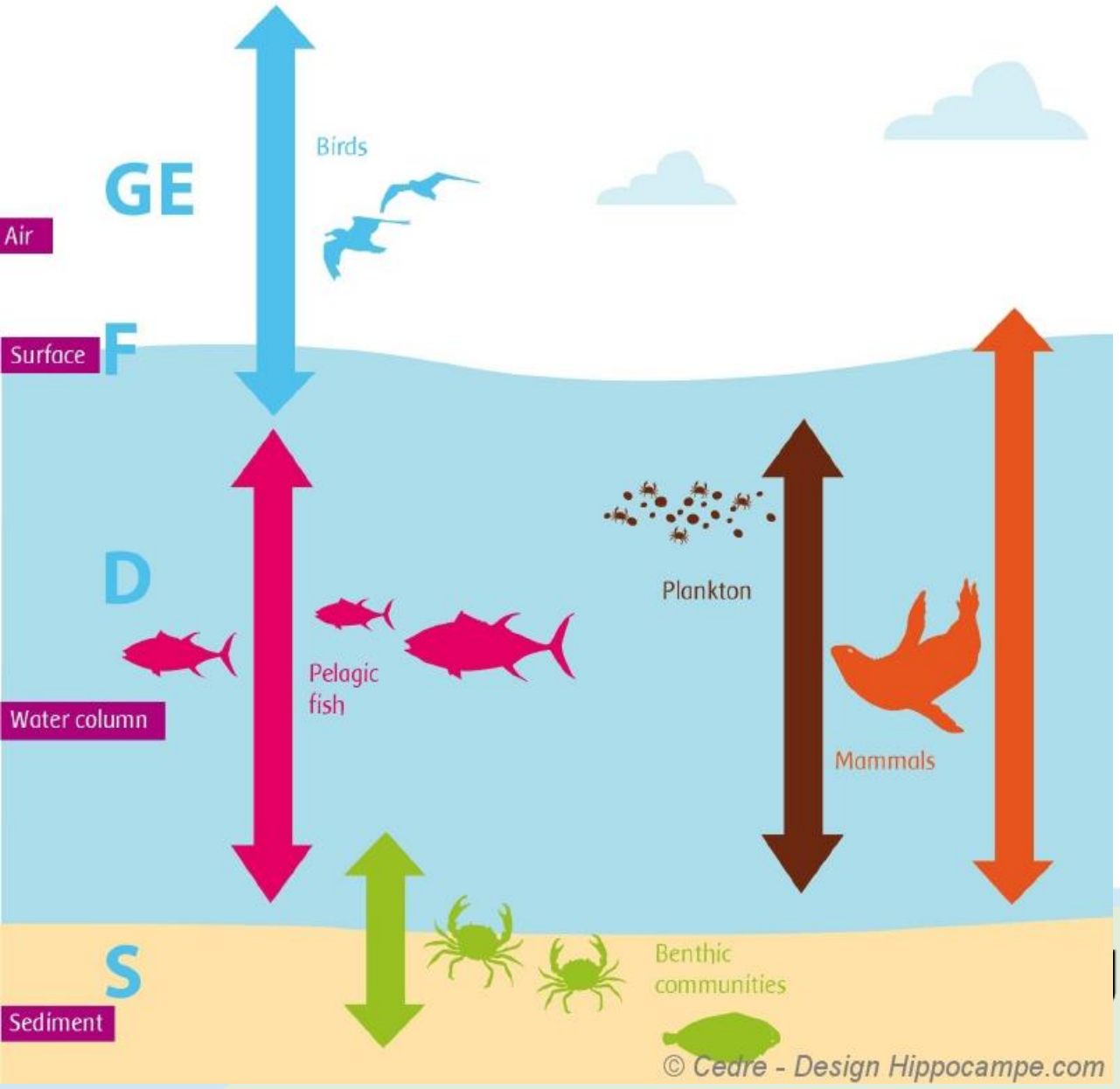
Long term behavior



Environmental effects monitoring

Trophic chain

NOFF

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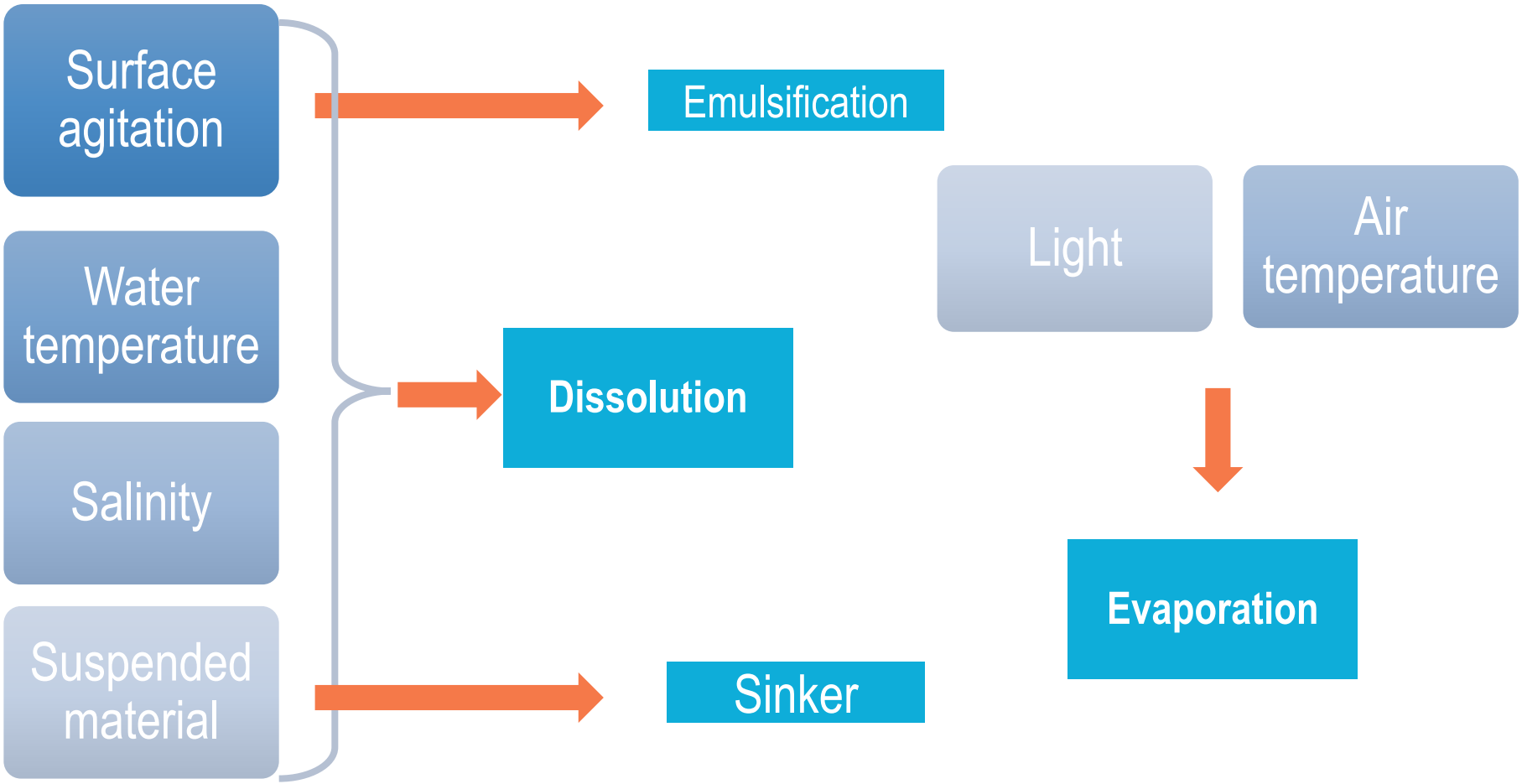
Influence of environmental parameters



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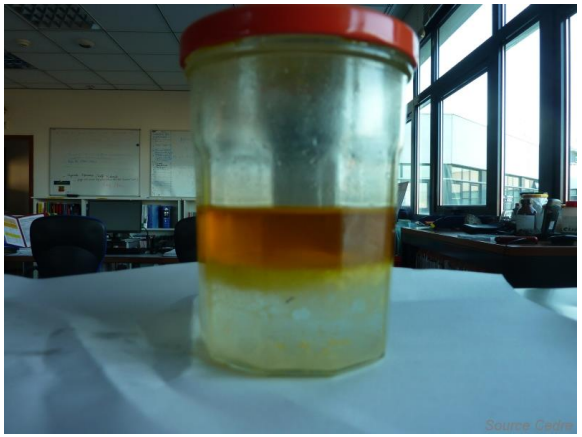
Influence of environmental parameters



Ex : Soybean oil

Response technique may evolve through time

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Long-term behavior - Keypoints

Environment → Monitoring impact

Behavior? → Can evolve with various parameters

Responses techniques → Needs to adapt to the change of behavior

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Keypoints

- Not only one behavior per compound
- Emergency context → quick answer
- Short-term → SEBC code
- Long-term → Monitoring the environment
- Perform research to assess precisely the behavior

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