Emulsions and Mr. Emulsifier

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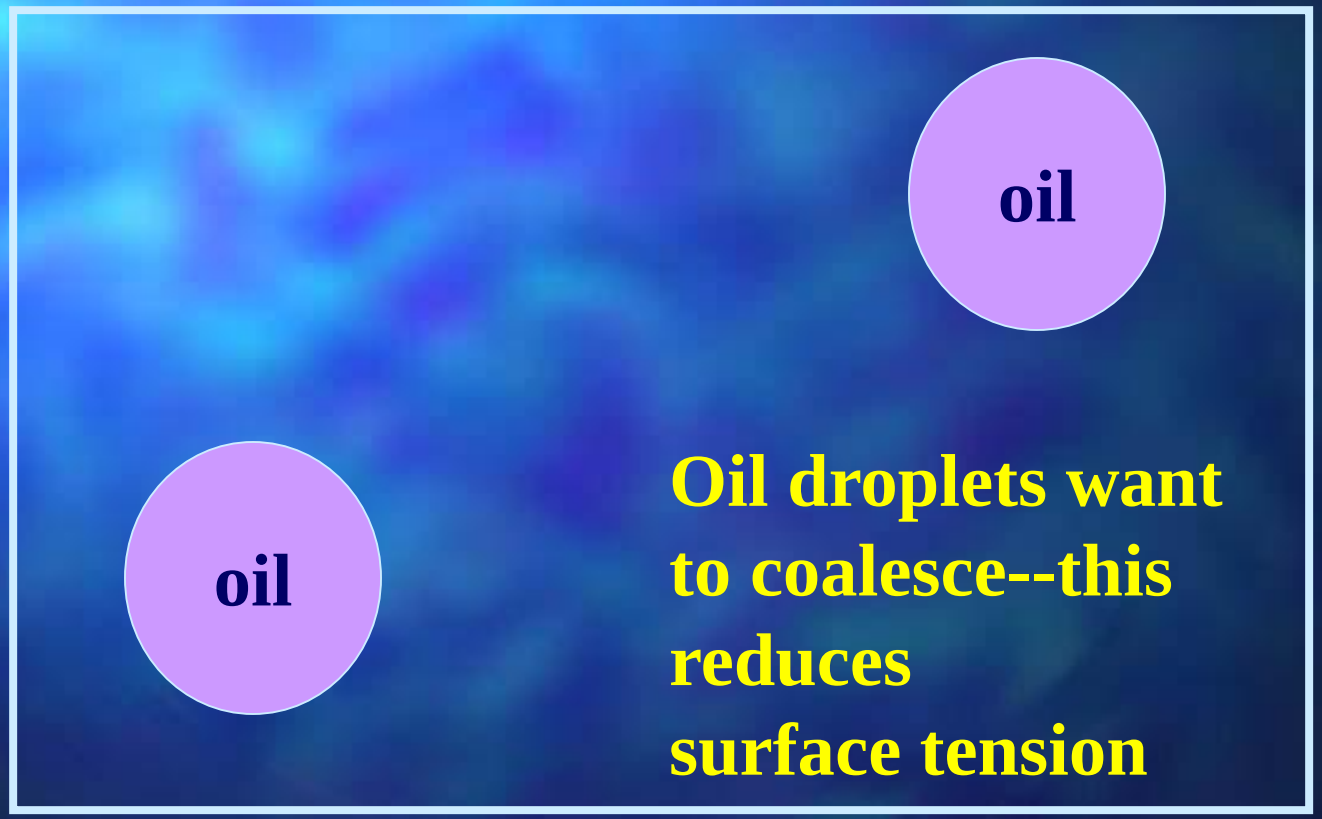
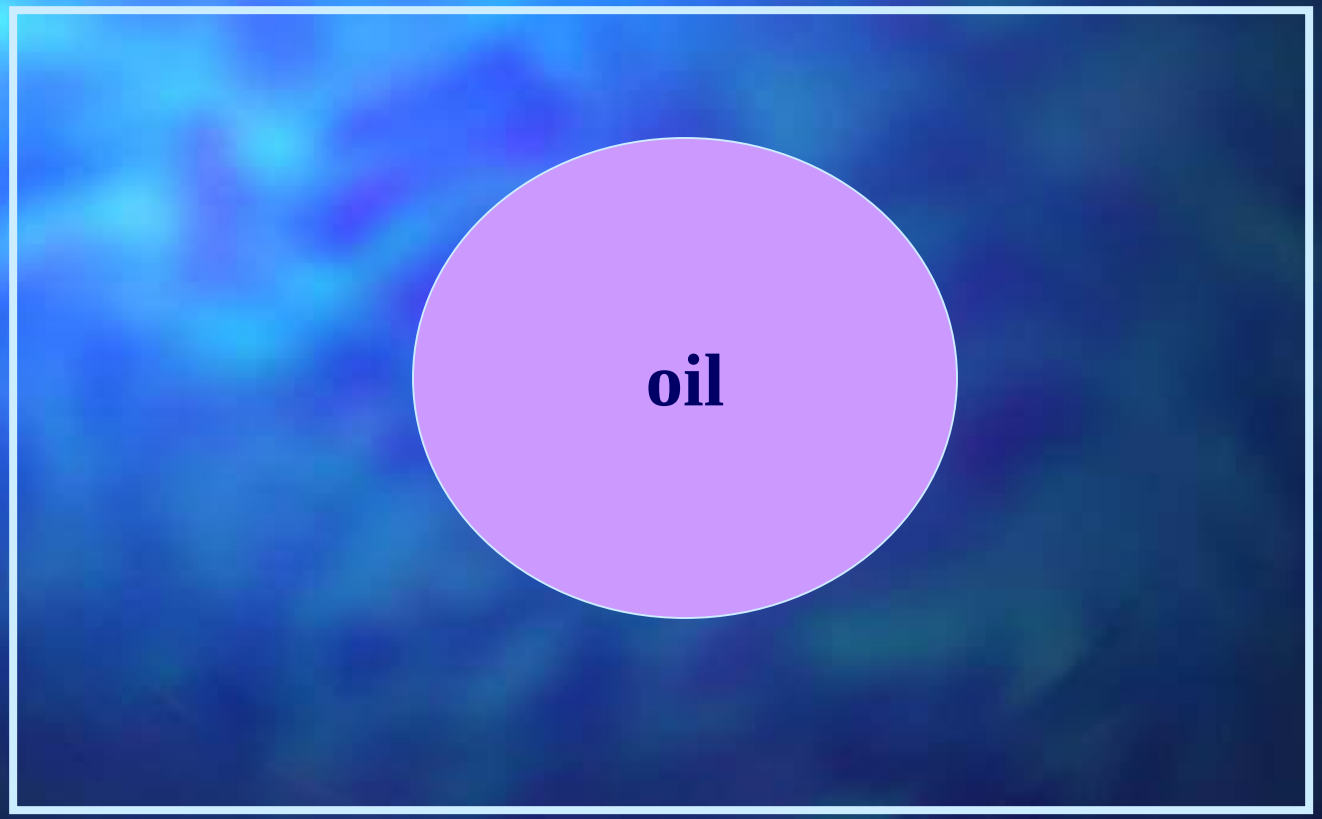
Emulsions

- We will examine an oil-in-water emulsion
- These are common in food systems and include things like mayonnaise
- Here is our prototypical system with two oil droplets dispersed in water

Emulsions (Oil in water, O/W)



Emulsions (Oil in water, O/W)



Emulsions (Oil in water, O/W)

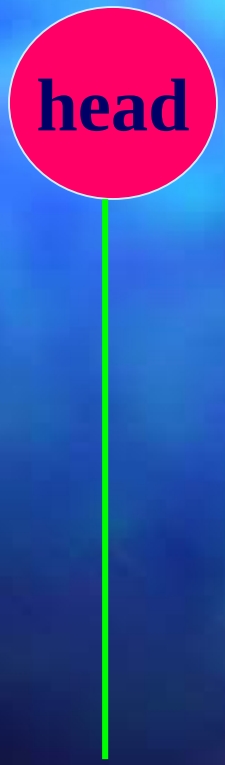
oil

Separates and floats to top because oil is less dense than water

Emulsions (Oil in water, O/W)

Emulsifiers

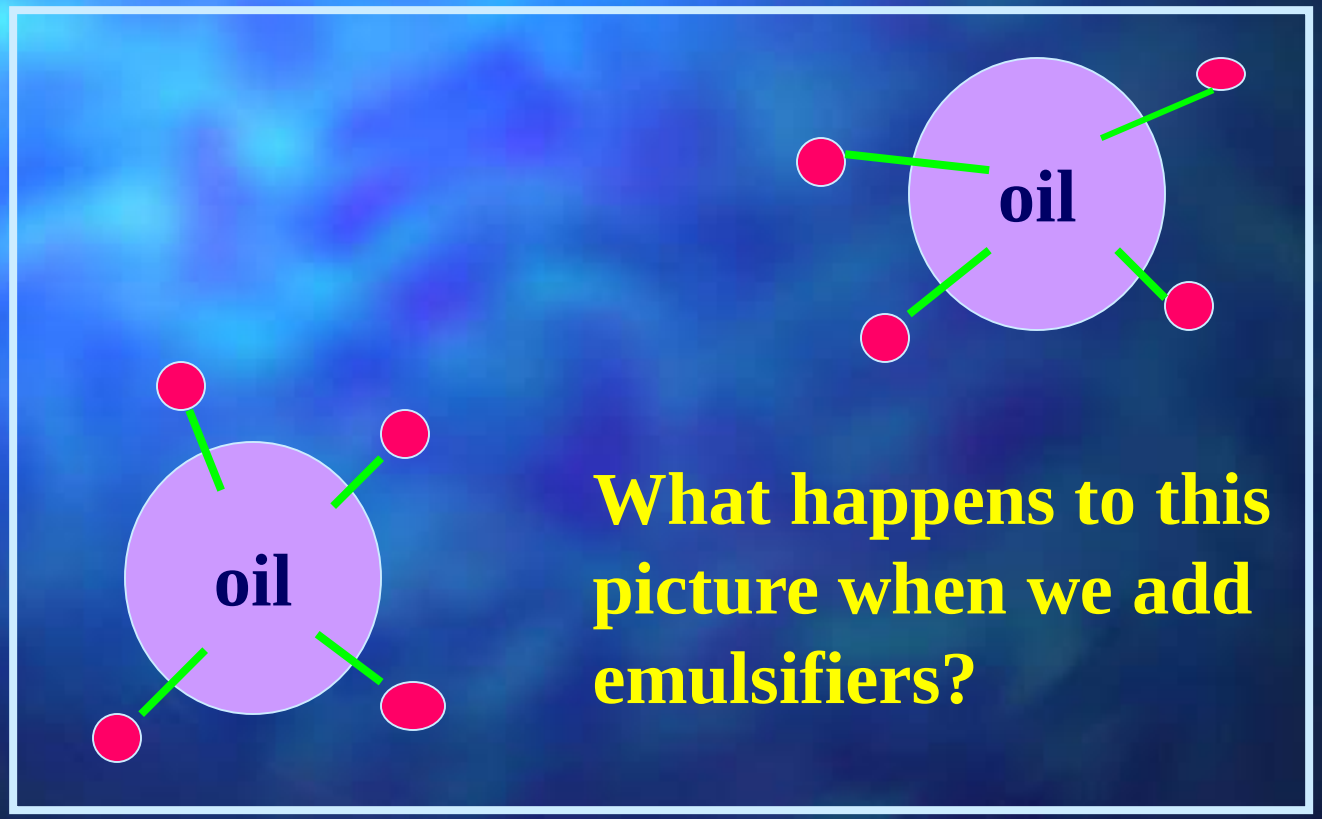
- Emulsifiers have the following general molecular features



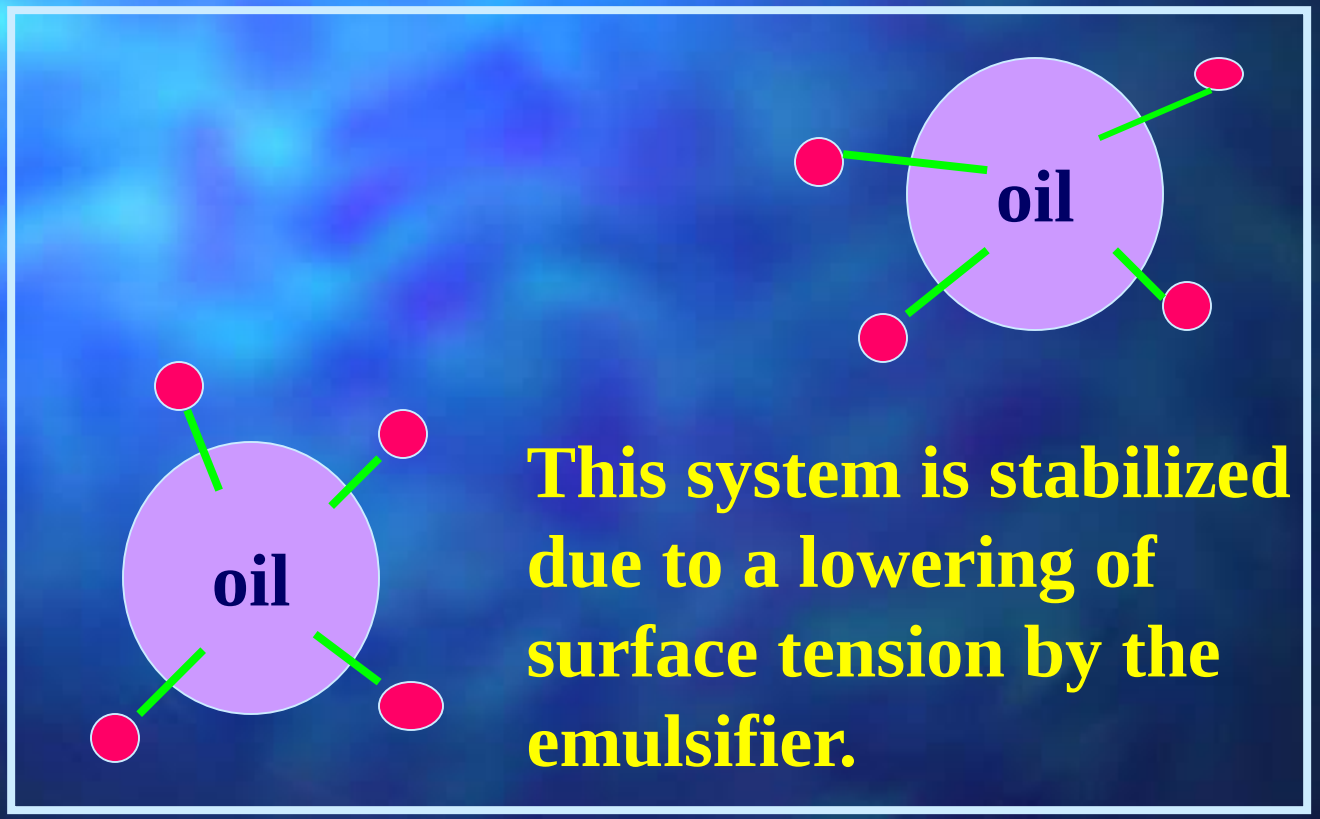
Polar head, likes water

Non-polar tail, likes oil

Emulsions (Oil in water, O/W)



Emulsions (Oil in water, O/W)



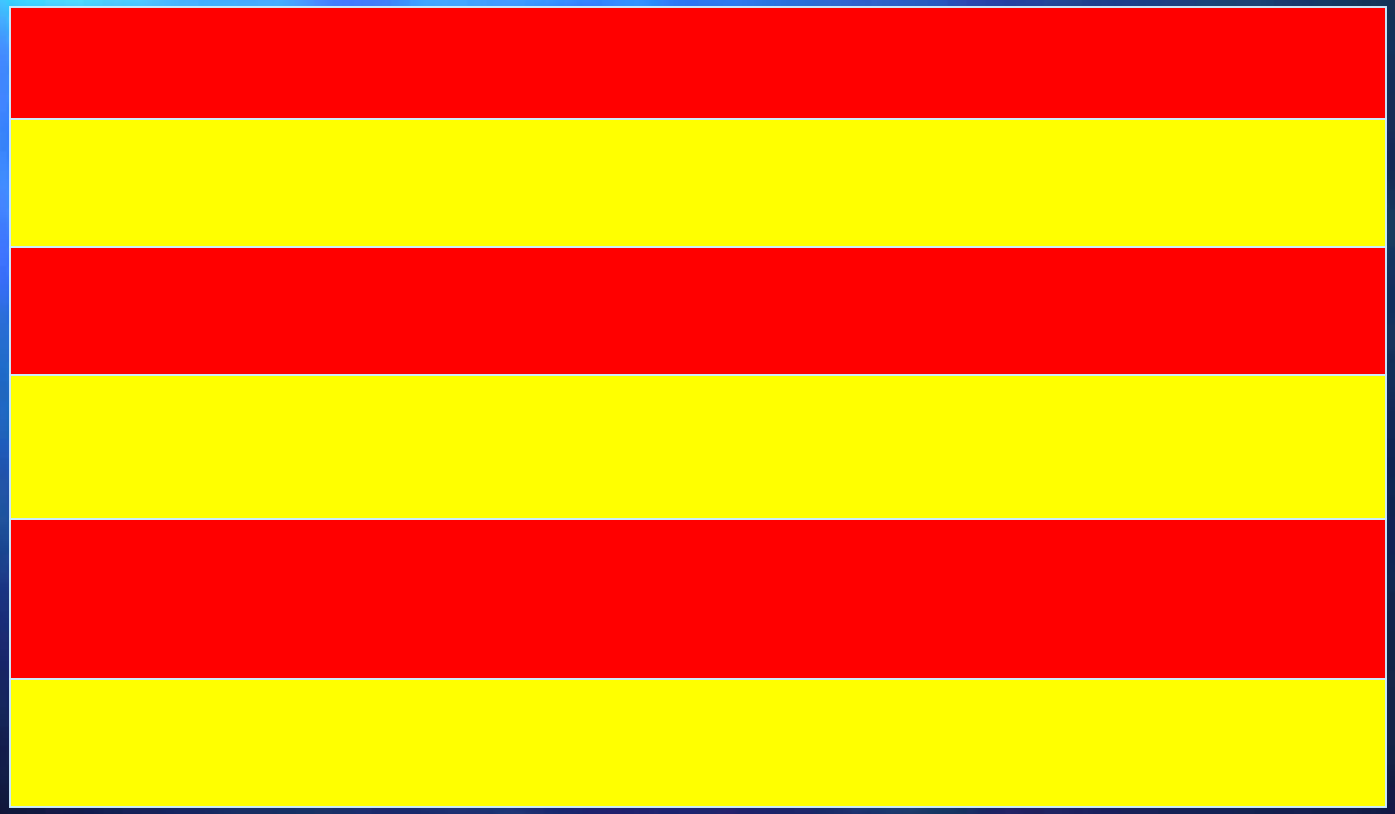
Emulsions (Oil in water, O/W)

- Now the water sees only the polar emulsifier heads (which, by the way, it likes)
- The oil droplets can see only the nonpolar emulsifier tails (for all it knows it is surrounded by oil)
- Everybody is happy and there is no driving force for separation of the phases

Emulsifier analogy

- When the Fenerbahçe team plays Galatasaray at Ali Sami Yen, the place is Yellow and Red of CİM BOM
- Like this

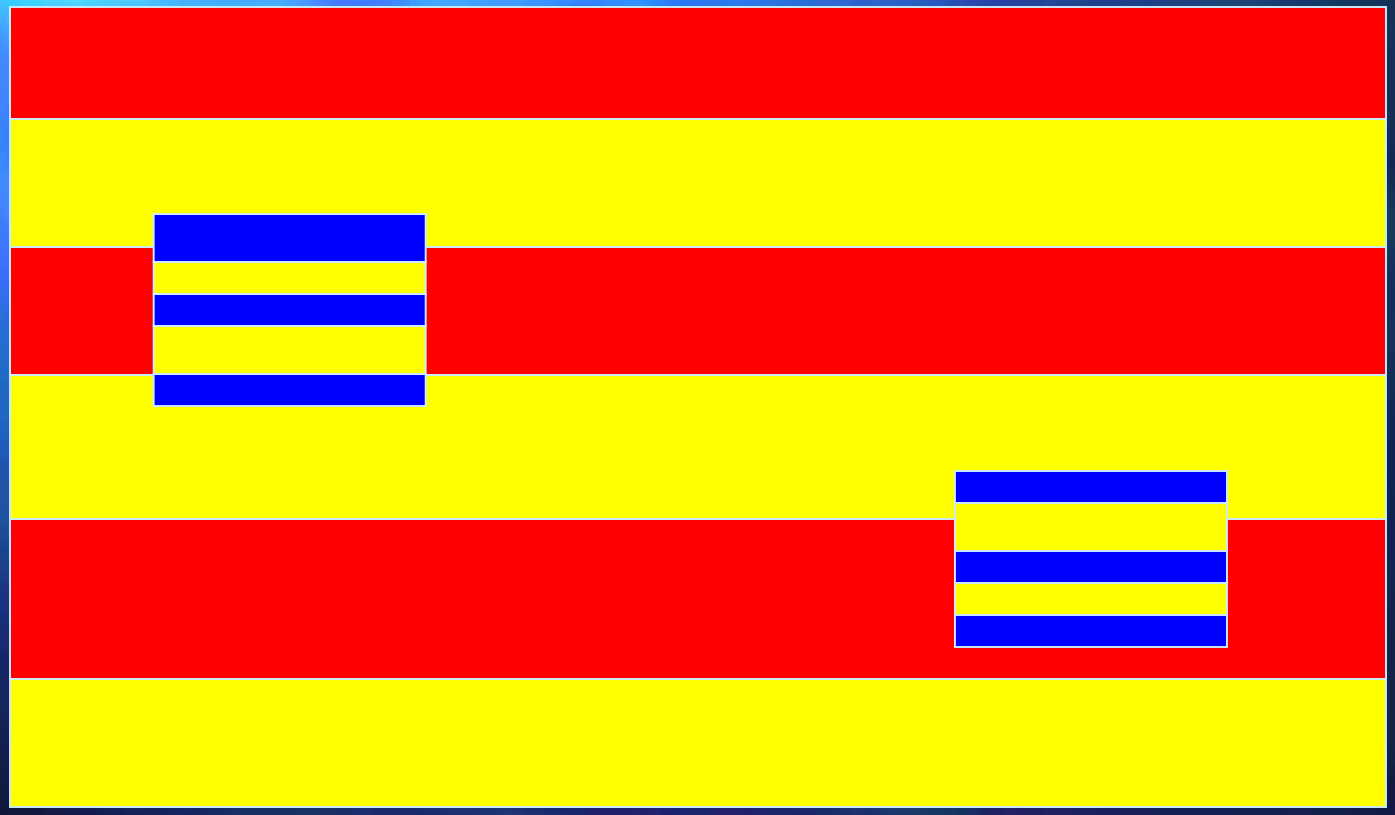
Emulsifier analogy



Emulsifier analogy

- To make things as uncomfortable as possible, Fenerbahçe fans are seated together in small, separated groups
- Like this

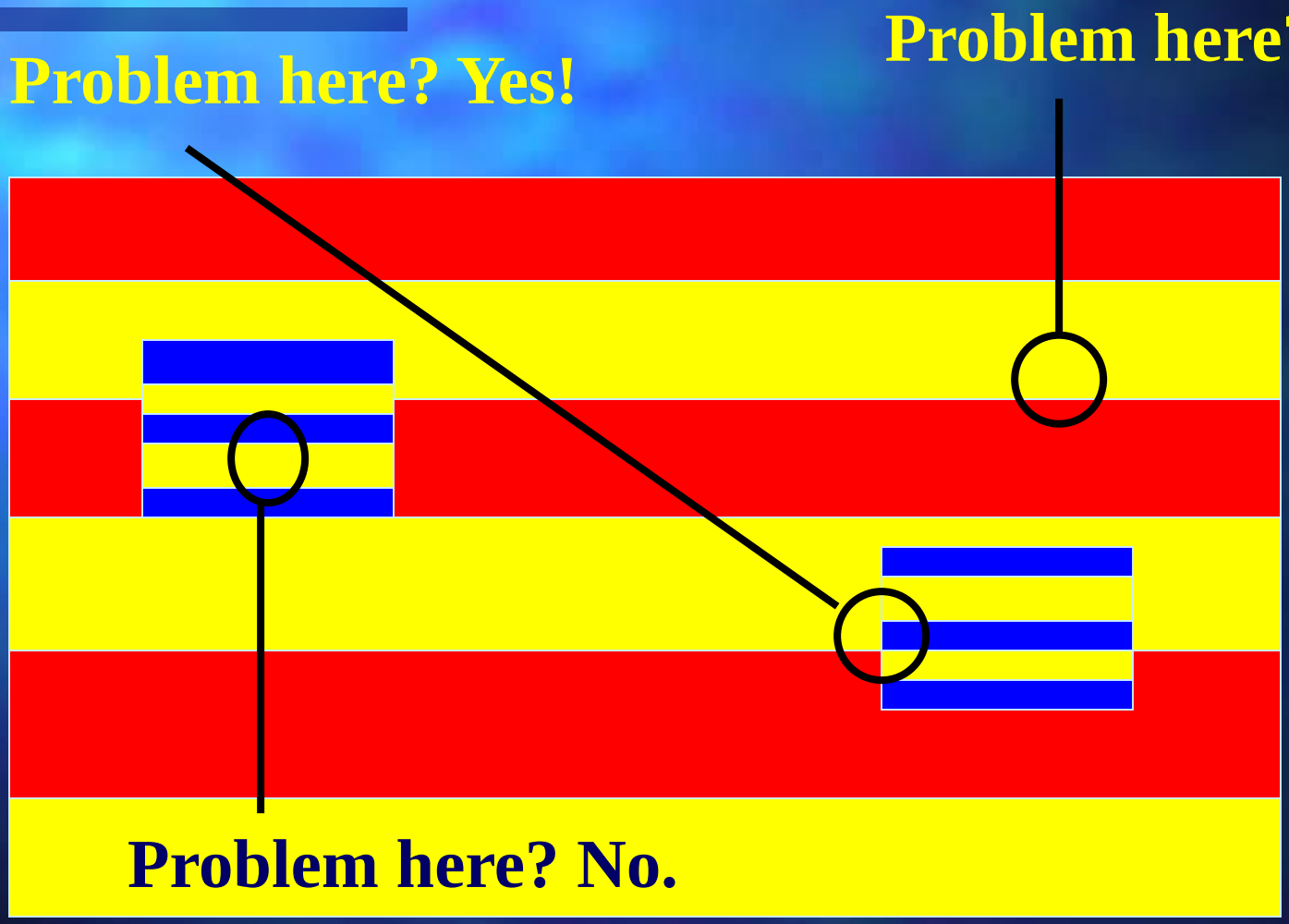
Emulsifier analogy



Emulsifier analogy

- In this set up, where are the problems likely to occur?
- Can you figure it out?

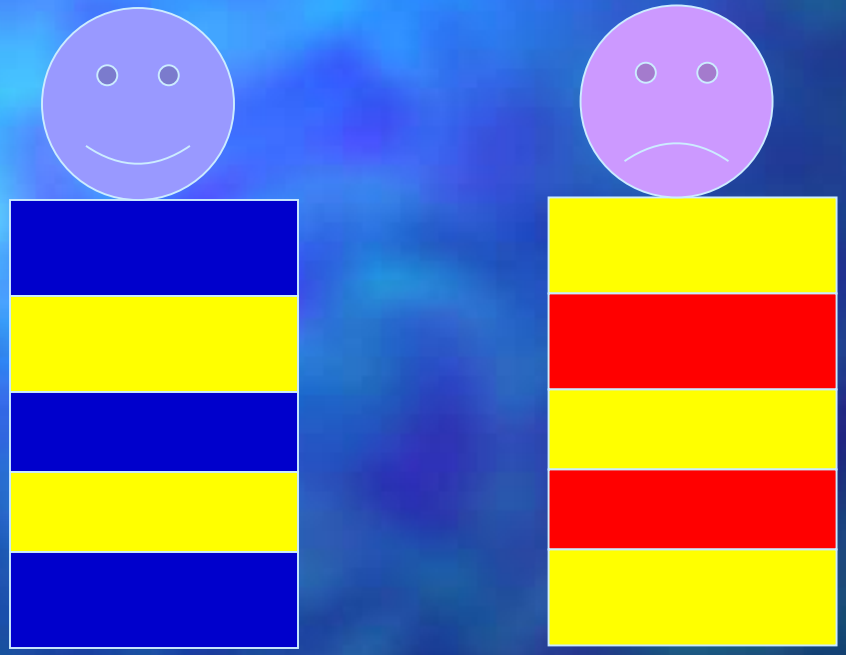
Emulsifier analogy



Emulsifier analogy

- How can we defuse this potential problem (high tension) at the interface between the Fenerbahçe and Galatasaray fans?
- Let's look at the interface more closely

Emulsifier analogy



Emulsifier analogy

- What we need at this point is a very special person
- This person played earlier both in Fenerbahçe and Galatasaray
- He likes both teams passionately
- He can’t decide who to cheer for

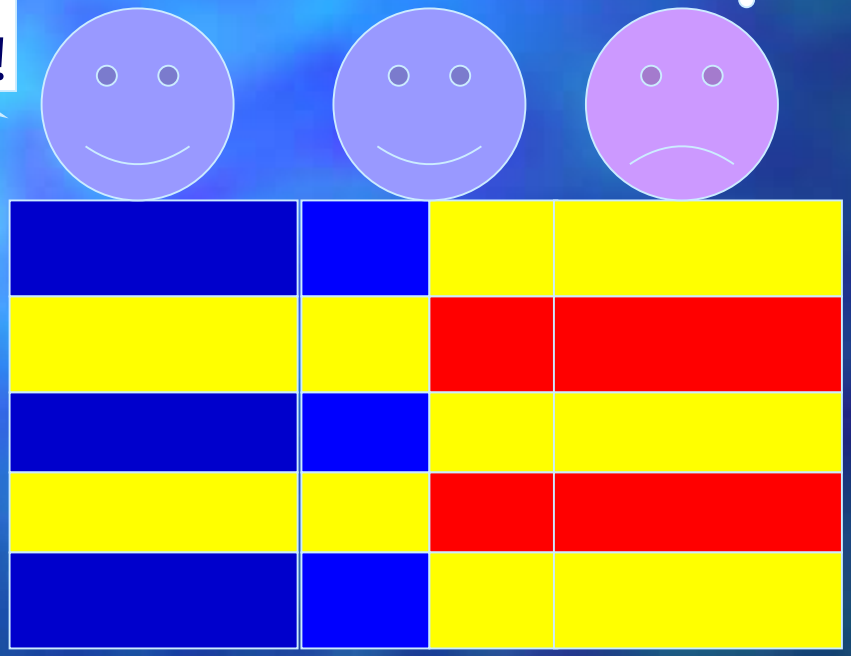
Emulsifier analogy

- In fact, he is so fanatical he has had special clothes made up which he wears to the games
- One half is Yellow and Blue
- One half is Yellow and Red
- Are you ready?
- Here he comes

Emulsifier analogy

Sarı Kanarya!

Cim Bom!!



Mr. Emulsifier

Emulsifier analogy

- Now the Galatasaray fan sees another Galatasaray fan sitting next to him and the Fenerbahçe fan sees an Fenerbahçe fan setting next to him
- Interfacial tension lowered
- Problem solved
- Haydi Sarı Kanarya!