



Colouring Foods – EU Regulatory Approach

Valerie Rayner

Colouring foods



- ▶ Difference between colours & colouring foods
- ▶ Legal difficulties – new guidance
- ▶ What does the guidance mean – calculations
- ▶ Further work

US Definition – Color Additive



- ▶ The term "color additive" means a material which—
- ▶ (A) is a dye, pigment, or other substance made by a process of synthesis or similar artifice, or extracted, isolated, or otherwise derived, with or without intermediate or final change of identity, from a vegetable, animal, mineral, or other source, and
- ▶ (B) when added or applied to a food, drug, or cosmetic, or to the human body or any part thereof, is capable (alone or through reaction with other substance) of imparting color thereto; except that such term does not include any material which the Secretary, by regulation, determines is used (or intended to be used) solely for a purpose or purposes other than coloring.

- ▶ Food ingredients such as cherries, green or red peppers, chocolate, and orange juice which contribute their own natural **color** when mixed with other foods are not regarded as *color additives* ; but where a food substance such as beet juice is deliberately used as a **color** , as in pink lemonade, it is a *color additive*.

EU Definitions – Colours



- ▶ Colours are:
 - ▶ substances which add or restore colour in a food, and include natural constituents of foods and natural sources which are normally **not consumed as foods as such and not normally used as characteristic ingredients of food.**
 - ▶ Preparations obtained from foods and other edible natural source materials obtained by physical and/or chemical extraction resulting in a **selective extraction** of the pigments relative to the nutritive or aromatic constituents are colours within the meaning of this Regulation
- ▶ And are not:
 - ▶ foods, whether dried or in concentrated form, including flavourings incorporated during the manufacturing of compound foods, because of their aromatic, sapid or nutritive properties together with a **secondary colouring effect;**

Legal definitions for colors



EU

USA

not consumed as foods as such and not normally used as characteristic ingredients of food;

Are selectively extracted

any material which...is capable of imparting a color thereto;

a food substance such as beet juice, deliberately used as a color ... is a *color additive*

Selective Extraction

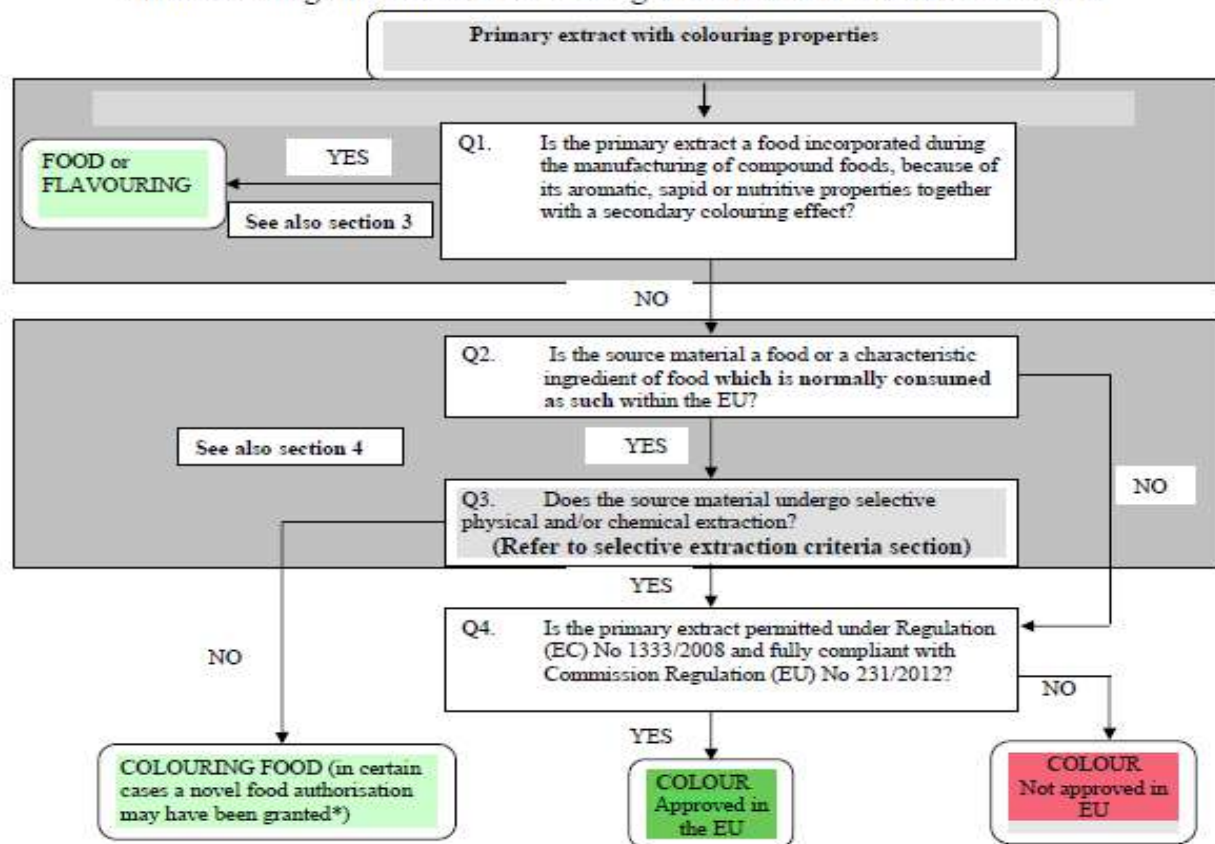


- ▶ Not defined in EU legislation
- ▶ Difficult to interpret
- ▶ Led to uncertainty in market

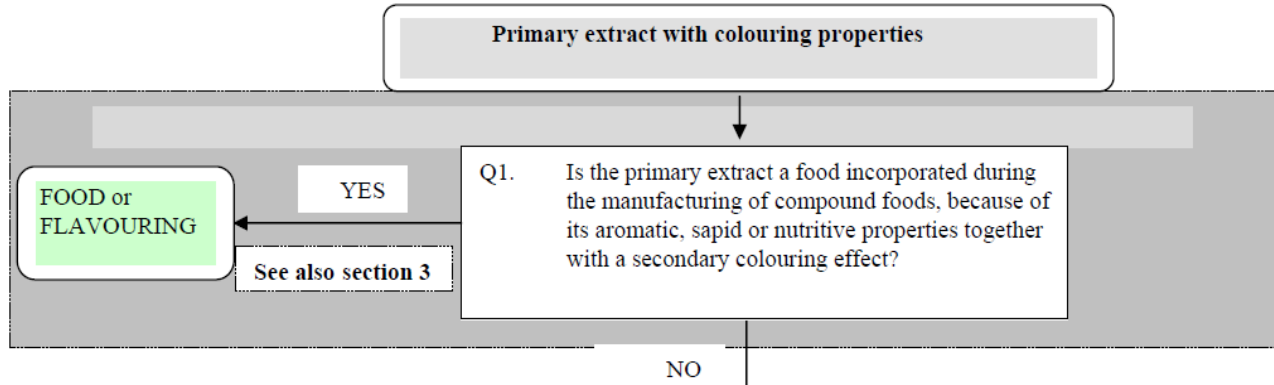
- ▶ Commission developed
- ▶ **Guidance notes on the classification of food extracts with colouring properties**

DECISION TREE

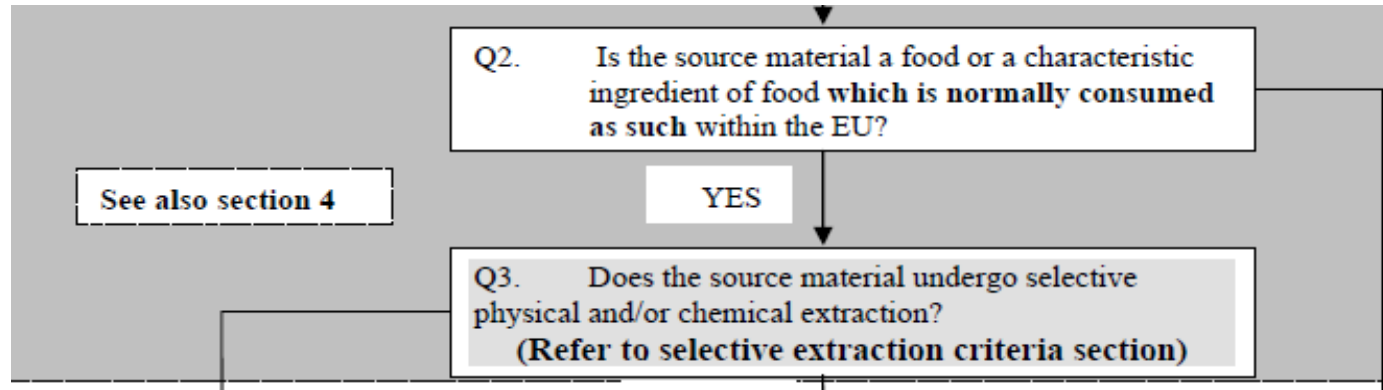
(to be used together with the Guidance notes and the checklist in Annex II)
How to Distinguish between a Colouring Food and an Additive Food Colour



Colouring Foods Decision Tree



Colouring Foods Decision Tree



Selective Extraction Criteria



- ▶ Does the primary extract retain the essential characteristic properties of the source material i.e.
 - Colour properties (pigment content)
 - Aromatic properties and nutritive value
- ▶ Is the ratio of the content of the pigment(s) to that of the nutritive or aromatic constituents in the primary extract significantly different from that present in the source material ...

Enrichment Factor



$$F_n = \frac{\frac{C_p}{N_p}}{\frac{C_s}{N_s}}$$

$$F_f = \frac{\frac{C_p}{A_p}}{\frac{C_s}{A_s}}$$

C_p = the "pigment(s) content" in the examined primary extract

C_s = the "pigment(s) content" in the source material

N_p = the "nutritive constituents content" in the examined primary extract

N_s = the "nutritive constituents content" in the source material



Enrichment Factor



- ▶ C_p = the "pigment(s) content" in the examined primary extract
- ▶ C_s = the "pigment(s) content" in the source material
- ▶ N_p = the "nutritive constituents content" in the examined primary extract
- ▶ N_s = the "nutritive constituents content" in the source material
- ▶ A_p = the "aromatic constituents content" in the examined primary extract
- ▶ A_s = the "aromatic constituents content" in the source material

Compare the same pigment in the source and the extract

Enrichment Factor



- ▶ C_p = the "pigment(s) content" in the examined primary extract
- ▶ C_s = the "pigment(s) content" in the source material
- ▶ N_p = the "nutritive constituents content" in the examined primary extract
- ▶ N_s = the "nutritive constituents content" in the source material
- ▶ A_p = the "aroma content" in the examined primary extract
- ▶ A_s = the "aroma content" in the source material

Total solids content – related to the parts of the source material from which the extract is obtained (e.g. orange juice, orange peel or orange pulp) and expressed on a dry weight basis

Enrichment Factor



- ▶ C_p = the "pigment(s) content" in the examined primary extract
- ▶ C_s = the "pigment(s) content" in the source material
- ▶ N_p = the "nutritive constituents content" in the examined primary extract
- ▶ N_s = the "nutritive constituents content" in the source material
- ▶ A_p = the "aromatic constituents content" in the examined primary extract
- ▶ A_s = the "aromatic constituents content" in the source material

Difficult to establish in practice



Example - Orange carrot extract



	Carrot (dry weight basis)	Carrot Extract (dry weight basis)
Total Solids	100	100
Colour content	0.1	0.3

$$F_n = \frac{\frac{C_p}{N_p}}{\frac{C_s}{N_s}} \quad F_n = \frac{\frac{0.3}{100}}{\frac{0.1}{100}} \quad F_n = 3$$

Practical Application



- ▶ Threshold for selective extraction set at 6
- ▶ Both F_n and F_f must be below 6
- ▶ Aromatic constituents are difficult to analyse so F_f is difficult to calculate
- ▶ Typically F_n will be used for classification but F_f is equally important in law
- ▶ Reference values for raw materials will be established in an Annex

Brown colours



- ▶ Caramels are made from sugars
- ▶ Sugars do not contain the brown pigments
- ▶ How can an enrichment factor be calculated?

Brown colours



- ▶ Caramels are made from sugars
- ▶ Sugars do not contain the brown pigments
- ▶ How can a concentration factor be calculated?

- ▶ Caramelised sugars and malt extracts are considered as foods in their own right

Next Steps



- ▶ Completion Annex III

Information for Annex III



Information on the source material used for the production of extracts with colouring properties

Organisation:	<i>Insert the name of the organisation</i>	Date of submission:	<i>Insert the date</i>
Contact person (name + email):	<i>Insert the name and email of the contact person</i>		
Source material:	<i>Insert the name of the source material + information from which parts of the source material is the extract obtained</i>		
Colouring principle of the extract/concentrate and/or extraction/concentration method:	<i>Insert the colouring constituents present in the extract/concentrates and information about the extraction/concentration method(s)</i>		

Data available on the source material as regards the content of:

	List	Data from literature available about the content	Analytical data available/ method for analysis
Pigment(s)¹	<i>pigment(s) present in the source material + proposal and justification as regards pigment(s) that should be used as a reference</i>		
Nutritive constituents	<i>Information on carbohydrates, fat, proteins, minerals and total solids</i>		
Aromatic constituents²	<i>Aromatic constituents present in the source material + proposal and justification as regards aromatic constituent(s) that should be used as a reference</i>		
Files enclosed containing the requested information	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>

¹ In the information provided it should be specified what pigment(s) should be included as a reference and what analytical method(s) should be used for its determination

² In the information provided it should be specified what substances should be used as a reference for aromatic constituents and what method(s) (analytical, sensorial) should be used for their determination

Information for Annex III



Information on the source material used for the production of extracts with colouring properties

Organisation:		Date of submission:	
Contact person (name + email):			
Source material:			

Source material:	<i>Insert the name of the source material + information from which parts of the source material is the extract obtained</i>
Colouring principle of the extract/concentrate and/or extraction/concentration method:	<i>Insert the colouring constituents present in the extract/concentrates and information about the extraction/concentration method(s)</i>

Pigment(s) ¹			
Nutritive constituents			
Aromatic constituents ²			
Files enclosed containing the requested information			

¹ In the information provided it should be specified what pigment(s) should be included as a reference and what analytical method(s) should be used for its determination

² In the information provided it should be specified what substances should be used as a reference for aromatic constituents and what method(s) (analytical, sensory) should be used for their determination



Information for Annex III



Information on the source material used for the production of extracts with colouring properties

Organisation:		Date of submission:	
Contact person (name + email):			
Source material:			
Colouring principle of the extract/concentrate and/or extraction/concentration method:			

	List	Data from literature available about the content	Analytical data available/ method for analysis
Pigment(s)¹	<i>pigment(s) present in the source material + proposal and justification as regards pigment(s) that should be used as a reference</i>		
Nutritive constituents	<i>Information on carbohydrates, fat</i>		

Files enclosed containing the requested information			
---	--	--	--

¹ In the information provided it should be specified what pigment(s) should be included as a reference and what analytical method(s) should be used for its determination
² In the information provided it should be specified what substances should be used as a reference for aromatic constituents and what method(s) (analytical, sensory) should be used for their determination



Information for Annex III



Information on the source material used for the production of extracts with colouring properties

Organisation:		Date of submission	
Contact person (name + email):			

	<i>that should be used as a reference</i>		
Nutritive constituents	<i>Information on carbohydrates, fat, proteins, minerals and total solids</i>		
Aromatic constituents²	<i>Aromatic constituents present in the source material + proposal and justification as regards aromatic constituent(s) that should be used as a reference</i>		
Files enclosed containing the requested information	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>	<i>Put the name of the file(s) or refer to the information provided for the road-test exercise</i>

Files enclosed containing the requested information:			
--	--	--	--

¹ In the information provided it should be specified what pigment(s) should be included as a reference and what analytical method(s) should be used for its determination
² In the information provided it should be specified what substances should be used as a reference for aromatic constituents and what method(s) (analytical sensoral) should be used for their determination



Next Steps



- ▶ **Completion Annex III**
 - Source material – parts used and material obtained
 - Extraction/Process method
 - Pigment(s) present in the source material + proposal and justification as regards pigment(s) that should be used as a reference
 - Nutritive constituents
 - Aromatic constituents – proposal & justification

Summary



- ▶ Colours are defined differently in US & EU
- ▶ EU guidance gives a flowchart and helps to determine whether a material has been selectively extracted
- ▶ Work is ongoing to determine reference values