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and storage practices will also result in the minimum of drip losses on thawing. Phosphates then will reduce weight loss on thawing, particularly from poorly frozen and stored fish. They will not effect the storage life of fish products, however, they may improve the appearance, particularly with poor quality raw material, dipping may mask some of the physical deterioration and thus give the impression of improved quality.

In fatty fish antioxidants have been shown to be most effective in the presence of phosphates. Some of the phosphates used commercially for fish include; sodium tripolyphosphate, sodium and potassium pyrophosphate. A 10% solution is normally recommended for dipping purposes. Higher levels may be used, however, an alkaline flavour which detracts from product quality can be imparted.

to be checked for fading and also increases the objectivity of the chart test. The fact that the colour of the object must be matched visually to the chart may also introduce error.

Objectives and its measurement in Foods

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The three main aspects of food sensory quality are appearance, sense of feel or texture and flavour. Of the three, appearance characteristics are probably the most important and the saying ‘We eat with our eyes’ is very true in most cases. Appearance factors can be subdivided into a number of areas: colour, gloss, shape, size, defects, oiliness, viscosity, etc.

Colour is very important in food and is used to judge the quality, maturity and age after harvest of many foods. Leafy green vegetables, for example, carrot colour is being changed rapidly to improve appeal to children. Many consumers often demand colours in foods that are not natural to the foods themselves and consumers in different countries have different colour preferences.

What is colour?

The human eye is sensitive to radiation in the wavelength region 380 to 760 mµ which produces the colour spectrum as we know it. In practical terms, colour may be thought of as having three attributes which can be expressed in a three-dimensional colour solid:

1. Dominant wavelength or hue
2. Lightness or value of reflectance
3. Purity or chroma or intensity

Dominant wavelength refers to the actual colour of the object. If the reflected wavelength is 650-700 mµ the object will look red. Lightness is a measure of the whiteness or darkness of an object on a scale from white through grey to black. Lastly, purity refers to the intensity of the colour. The narrower the wavelength span for a colour the more intense it will be.

Objective versus subjective measurement

Objective methods for measuring colour are more precise than subjective methods and can usually be converted to x, y and z values of the CIE standard system. This is the system recommended by the International Committee on Illumination and is based on the ‘standard observer’ which may be thought of as a simulated standard eye.

Colour of a set of samples can be assessed quite well with a visual panel. However, human colour memory is bad and this type of subjective assessment fails when the panel is asked to compare the colour of the samples with those they saw some weeks previously. An objective method is usually necessary for any colour measurement which is being carried on over a period of time.

Visual panels are very important when calibrating an objective method. It is important to relate the spread of values obtained from an objective method with the visual spread from a panel, eg, if the panel considers that there is a large colour difference between two samples it is important that this also shows up as a large difference in readings on the instrument.

Colour charts can be very useful provided their limitations are realised. Use of a colour chart book is not recommended; colour charts should be made for a particular purpose when required. If for example, carrot colour is being measured, three or four charts covering the relevant colour range can be made. They should be calibrated with an objective instrument such as a Hunter Colour Difference meter. This enables them

In Table 1 show the scales (L, a, b or ratios) found suitable at Kinsealy Research Centre for various fruits, vegetables, jams, etc. and also Hunter meter values for extremes of colour in these products. Various colour acceptability levels can be decided upon (based on visual panel assessments). For example, fresh mushrooms for sale at wholesale level should have an L value > 80; cauliflower with an L/b ratio of <3.00 is not suitable for freezing; carrots for bottling should have an ‘a’ value +30; white wine with an L/b ratio +2.0 is too dark, etc.