(11) Malt Extract and Malt Flour

(i) *England.* | (ii) *Scotland,* p.504.

(i) England

THE AGRICULTURAL PRODUCE (GRADING AND MARKING) (MALT EXTRACT AND MALT FLOUR) REGULATIONS, 1936, DATED MARCH 20, 1936, MADE BY THE MINISTER OF AGRICULTURE AND FISHERIES AS TO GRADE DESIGNATIONS AND GRADE DESIGNATION MARKS FOR MALT EXTRACTS AND MALT FLOURS.

1936 No. 309

In exercise of the powers conferred on him by the Agricultural Produce (Grading and Marking) Acts, 1928 and 1931, the Minister of Agriculture and Fisheries hereby makes the following Regulations :— 18 & 19 Geo. 5. c. 19. 21 & 22 Geo. 5. c. 40.

1. Grade designations to indicate the quality of malt extract produced in England and Wales from barley grown in the United Kingdom shall be as follows :— Prescription of grade designation.

ALL-ENGLISH (PHARMACEUTICAL) MALT EXTRACT or alternatively (subject to the conditions stated in the footnote to the First Schedule hereto) NATIONAL MARK (PHARMACEUTICAL) MALT EXTRACT

ALL-ENGLISH (BAKERS') MALT EXTRACT (WHITE BREAD)

ALL-ENGLISH (BAKERS') MALT EXTRACT (BROWN BREAD)

ALL-ENGLISH (VETERINARY) MALT EXTRACT

and the quality indicated by such grade designations shall be deemed to be as described in the First Schedule hereto.

2. Grade designations to indicate the quality of malt flours produced in England and Wales from barley and/or wheat grown in the United Kingdom shall be as follows :—

ALL-ENGLISH MALT FLOUR (WHITE BREAD)

ALL-ENGLISH MALT FLOUR (BROWN BREAD)

and the quality indicated by such grade designations shall be deemed to be as described in the Second Schedule hereto.

3. Quality as defined in the First and Second Schedules shall be ascertained by the method of analytical determination of certain constituents as set out in the Third Schedule hereto.

Prescription of grade designation mark.

4. A grade designation mark shall be any one of the grade designations specified in regulations 1 and 2 above, associated with the words " Empire Buying Begins at Home " and with the following mark, namely, a map of England and Wales in silhouette with the words " Produce of England and Wales " inscribed in a circle placed centrally in the map within which circle is a design representing the Union Jack and which is more particularly described in the Fourth Schedule hereto.

Construction of certificates of authorisation.

5. In any certificate issued by the National Mark Committee under the Agricultural Produce (Grading and Marking) (General) Regulations, 1928,(**a**) authorising the marking of containers of malt flour and/or malt extract with the grade designation marks prescribed by the Regulations hereby revoked, references to the said Regulations shall be construed as references to these Regulations.

Date of coming into operation and revocation.

6. These Regulations shall come into operation on the 20th March, 1936, on which date the Agricultural Produce (Grading and Marking) (Malt Extract and Malt Flour) Regulations, 1933,(**b**) shall be revoked, but without prejudice to anything done thereunder before the date of coming into operation of these Regulations.

Short title.

7. These Regulations may be cited as the Agricultural Produce (Grading and Marking) (Malt Extract and Malt Flour) Regulations, 1936.

In witness whereof the Official Seal of the Minister of Agriculture and Fisheries is hereunto affixed this 20th day of March, 1936.

(L.S.) *Charles J. H. Thomas,*
Secretary.

FIRST SCHEDULE

MALT EXTRACTS PRODUCED IN ENGLAND AND WALES FROM BARLEY GROWN IN THE UNITED KINGDOM : GRADE DESIGNATIONS AND DEFINITIONS

(a) *Pharmaceutical Malt Extract.*

Grade Designation	Definition of Quality.†
All English (Pharmaceutical) Malt Extract or alternatively *National Mark (Pharmaceutical)MaltExtract	*General.*—The Extract shall be prepared from sound, clean malted grain by digestion with water at a suitable temperature and by evaporation of the strained liquid under reduced pressure at a temperature not exceeding 55°C. until an amber or yellowish brown viscous product is obtained having the characteristic agreeable odour and sweet taste. The product shall be miscible with water in all proportions, forming a translucent solution. *Special.*—The protein content shall not be less than 4.5 per cent. of the total weight. The arsenic content shall not exceed 1.4 parts per million. The specific gravity at 15.5°C. shall be from 1.40 to 1.42, and the refractive index at 20°C. from 1.4892 to 1.4976.

*The alternative grade designation may only be used in connection with pharmaceutical malt extract to which the grade designation mark as set out in the Fourth Schedule has been lawfully applied in accordance with the Agricultural Produce (Grading and Marking) (General) Regulations, 1928.(**a**)

† Extract of Malt as defined in the British Pharmacopoeia, 1932, would conform with these requirements.

(**a**) S.R. & O. 1928 No. 674, p.391 above. (**b**) S.R. & O. 1933 (No. 540) p. 192.

(b) *Bakers and Veterinary Malt Extracts.*

Grade Designations	Definition of Quality	
	Particular Characteristics	Common Characteristics
All-English (Bakers) Malt Extract (White Bread).	Diastatic activity shall be not less than 40 Lintner value.	*General.*—The product in each case shall be the water soluble extract derived from commercially sound, clean malted grain.
All-English (Bakers) Malt Extract (Brown Bread).	None.	*Special.*—The specific gravity at 15.5°C. shall be not less than 1.4 and the soluble protein content not less than 4.5 per cent. of the total weight.
All-English (Veterinary) Malt Extract.	None.	

SECOND SCHEDULE

MALT FLOURS PRODUCED IN ENGLAND AND WALES FROM BARLEY AND/OR WHEAT GROWN IN THE UNITED KINGDOM: GRADE DESIGNATIONS AND DEFINITIONS

Grade Designations	Definitions of Quality	
	Special Characteristics	Common Characteristics
All-English Malt Flour (White Bread).	Diastatic activity shall not be less than 40 Lintner value.	*General.*—The flour shall be the pure ground product of cleaned malted grain and be sound, free from taint or objectionable flavour, and of good keeping quality. *Special.*—The maximum content of water shall be 10 per cent., of ash 1.3 per cent., and of fibre 1.5 per cent. of the total weight.
All-English Malt Flour (Brown Bread).	None.	*General.*—The flour shall be the pure ground product of cleaned malted grain and be sound, free from taint or objectionable flavour, and of good keeping quality. *Special.*—The maximum content of water shall be 10 per cent., of ash 1.75 per cent., and of fibre 2.5 per cent. of the total weight.

THIRD SCHEDULE

Particular methods to be employed for the analytical determination of certain constituents for which a maximum or minimum content is prescribed in the two preceding schedules attached to these regulations.

(a) DIASTATIC ACTIVITY (OR LINTNER VALUE)

The following detailed instructions are to be carefully followed.

Soluble Starch

Digest purified potato starch with dilute hydrochloric acid of specific gravity 1.04 (in the proportion of 1 lb. of starch to 1 litre of dilute acid) at a temperature not exceeding 20°C. for seven days, well shaking the mixture daily. Thoroughly wash the starch by decantation, first with tap water until the washings react only faintly acid, and then four times with distilled water. Weigh about 20 grammes of the well-mixed sludge, dissolve in 200 millilitres of boiling distilled water and neutralise with N/10 sodium hydroxide solution, using 2 or 3 drops of alizarin cream as indicator. Add to the remaining weighed starch sludge the calculated amount of sodium hydroxide solution just to neutralise its acidity, shake thoroughly and set aside for 12 hours. Wash by decantation three times with distilled water, collect the soluble starch on a paper in a Buchner funnel and drain as far as possible by suction. Transfer to new unglazed porous plates and dry at a moderate temperature (40—45°C.) as quickly as possible. When the moisture content has been reduced to about 15 per cent., grind the soluble starch in a porcelain mortar and rub through a fine hair sieve.

Soluble Starch Solution

Rub 20 grammes of soluble starch into a cream with water and pour into about 700 millilitres of boiling water.

Bring to the boil, continue heating for a further 2 minutes, then cool to about 20°C., shaking frequently to prevent the formation of a skin. Add 20 millilitres of acetate buffer solution (see below) and dilute to 1 litre with water. (10 millilitres of this solution should not reduce 0.1 millilitre of Fehling's solution).

Fresh soluble starch solution is to be made for each day's determinations, uniform conditions of boiling, etc., being maintained as far as possible.

Acetate buffer solution.—One litre to contain 68 grammes of sodium acetate (CH^3COONa, $3H^2O$) and 500 millilitres of N/1 acetic acid.

Malt Extract (Syrup) Solution

Five per cent. solution. Weigh 10 grammes of extract in a porcelain basin and break down with cold water. (On no account must heat be used to assist in weighing or bringing into solution). Transfer the solution to a 200 millilitre graduated flask, dilute to the mark at 15°C. and shake well. Weaker solutions, also made up at 15°C., are prepared from this. The solutions must not be filtered, and are to be used as soon as possible for starch conversion.

Malt Extract (Flour) Solution

Five per cent. solution. Weigh 10 grammes of flour into a beaker, add 200 millilitres of water at 15°C. and thoroughly stir the mixture. Cover and digest for 3 hours in a water-bath at a temperature of 21°C., stirring at intervals of half-an-hour. At the end of three hours filter through a good quality filter paper. Reject the first 25 millilitres of filtrate and if the remainder of the filtrate is not quite bright re-pass it through the paper. This solution, or weaker solutions prepared from it, is to be used as soon as possible for starch conversion.

Method of Starch Conversion

Measure 100 millilitres of soluble starch solution into a 200 millilitre graduated flask and immerse, suitably supported in a water-bath maintained at 21°C. Place a standardised thermometer in the flask and when the contents have reached 21°C. add, by means of a narrow bore pipette (N.P.L. Standard), a definite volume (which should not normally exceed 10 millilitres), measured at 15°C., of the malt extract solution and mix well. (The volume needed will depend upon the diastatic activity of the extract and will be about $\frac{80}{\text{diastatic activity of the sample}}$ millilitres of 5 per cent. solution, or correspondingly larger volumes of 2½ or 1 per cent. solutions). Maintain the contents of the flask at 21°C. for *exactly* one hour. Then add 20 millilitres of N/10 sodium hydroxide solution and mix immediately, care being taken to wash down the thermometer and also to allow the alkali to flow over the inner surface of the neck of the flask. Cool the solution to 15°C., dilate to 200 millilitres with water and shake well. This solution is referred to in the method of titration as *the conversion solution.*

Method of Titration

Measure from a burette into a 200 millilitre round bottom flask 5 millilitres of Fehling's solution (see later) and heat over a naked flame with continuous rotation of the flask until the solution boils. Run from a burette into the boiling liquid 5 millilitres of the conversion liquid and subsequently further quantities. After each addition boil the liquid, the flask being continuously rotated. When the blue colour of the copper solution has nearly disappeared add 0.2 millilitre of 1 per cent. aqueous solution of methylene blue. Continue the titration with small quantities of the conversion solution, say 0.5 to 0.1 millilitre, or drop by drop, until the blue colour of the indicator just disappears. (Notes.—The indicator is not added until the end point is nearly reached as the final change is very rapid. The complete decolorisation of the methylene blue is indicated by the whole reaction liquid, in which the precipitated cuprous oxide is continually being churned up, becoming bright red or orange in colour. To ensure that the end point has been reached hold the flask against a sheet of white paper and if the indicator is completely decolorised there will be no blue tint at the edge of the liquid. The boiling process must be sufficiently continuous to prevent air obtaining access to the flask and so causing oxidation of the indicator with re-appearance of the blue colour).

If the volume of the conversion solution used to reduce 5 millilitres of Fehling's solution is less than 20 millilitres or more than 25 millilitres, the conversion must be repeated using less or greater quantities of the malt extract solution, in order to obtain a titration between these limits. If the extract solutions have become aerated in any way or subjected to warm conditions, it will be necessary to re-weigh and carry out the dilutions again.

A first titration to obtain approximate results is to be followed by a second, and third if necessary, to establish the end point accurately. A confirmatory titration should be carried out in every case.

Fehling's Solution

Measure accurately into a dry flask equal quantities of the component solutions Nos. 1 and 2, and mix well.

Solution No. 1. One litre to contain 69.28 grammes of crystallised copper sulphate, $CuSO^4$, $5H^2O$.

Solution No. 2. One litre to contain 346 grammes of rochelle salt and 150 grammes of sodium hydroxide.

Freshly mix the component solutions for each day's determinations.

Checked against 0.1 per cent. standard invert sugar solution by the method of titration described above, 5 millilitres of Fehling's solution corresponds to 0.02533 gramme of invert sugar.

Method of Calculating Diastatic Activity (Lintner Value)

Express the result according to the following formulae :—

(*a*) in the case of flour, Diastatic Activity (or Lintner Value)

$$= \frac{1000}{X \times Y}$$

(*b*) in the case of syrup, Diastatic Activity (or Lintner Value)

$$= \frac{1000}{X \times Y} \text{ minus } 9.$$

where X = number of millilitres of 5 per cent. malt extract solution in 100 millilitres of the conversion solution.

Y = number of millilitres of conversion solution required to reduce 5 millilitres of Fehling's solution.

and 9 = a constant denoting the assumed equivalent of the reducing sugars present in the malt extract (syrup) used in making the determination.

(Example :—Conversion performed with 1.6 ml. of 2.5 per cent. malt extract (syrup) solution, and 25.0 ml. of conversion solution required to reduce 5 ml. of Fehling's solution.

X = 0.4 ml. Y = 25.0 ml.

Diastatic Activity (or Lintner Value)

$$= \frac{1000}{0.4 \times 25.0} \text{ minus } 9 = 100 \text{ minus } 9 = 91.$$

Notes

1. There is a tendency for a film to form on glassware used in starch conversions, and all apparatus used for this purpose should be cleaned with warm sulphuric acid containing a little chromic acid and subsequently thoroughly washed.

2. Distilled water is to be used in making up all solutions and for rinsing apparatus.

3. When carrying out these determinations, it will be found advantageous to make simultaneously control determinations on a malt flour or syrup of known diastatic activity.

(b) FIBRE-CONTENT

Two or three grammes, accurately weighed, shall be extracted with petroleum spirit, b.pt. 40—60°C. in an extraction apparatus, or at least three times by stirring, settling and decantation, and the dry residue transferred to a conical 1,000 ml. flask. The material must not be further ground during extraction. A volume of 200 ml. of a solution containing 1.25 grammes of sulphuric acid (H^2SO^4) per 100 ml. measured at ordinary temperature and brought to boiling point, shall be added to the flask and heated. The contents of the flask must come to boiling within 1 minute and the boiling throughout must be gentle and continuous for exactly 30 minutes, the original volume being maintained. The flask shall be rotated every few minutes in order to mix the contents and remove particles from the sides. At the end of 30 minutes the flask shall be removed and the contents poured at once into the shallow layer of hot water remaining in a funnel fitted with a pump-plate or alternatively into the similar layer remaining in a Buchner funnel. The funnel shall be prepared by cutting a piece of cotton cloth or filter paper to cover the holes, so as to serve as a support for a disc of ordinary filter paper; boiling water shall be poured into the

funnel and allowed to remain until the funnel is hot, whereupon suction is applied. The experiment shall be discarded if the time of filtration of the bulk of the 200 ml. exceeds 10 minutes. The residues shall be washed with boiling water until the washings are free from acid. The residue shall then be washed from the filter paper back into the flask with a volume of 200 ml. of a solution of sodium hydroxide, containing 1.25 grammes of sodium hydroxide (NaOH) per 100 ml. free or nearly free from sodium carbonate, measured at ordinary temperature, and brought to boiling point. The contents of the flask shall be boiled for exactly 30 minutes, the precautions given for the treatment with acid being observed. At the end of 30 minutes the flask shall be removed and its contents immediately filtered through an ordinary filter paper. The residue collected in the filter paper shall be washed with boiling water, then with solution of 1 per cent. hydrochloric acid and again with boiling water until free from acid. The residue shall then be washed twice with 95 per cent. alcohol, and three times with ether. The residue shall then be transferred to a dried weighed ashless filter paper, dried at about 100°C. in an oven and weighed in its weighing bottle until constant in weight. The ash of the paper and contents shall be determined by incineration at a dull red heat. The weight of ash shall be subtracted from the increase of weight found on the paper and the difference shall be reported as fibre.

(c) Ash Content

The ash content shall be ascertained by heating a measured quantity of the substance in a muffle furnace at such temperature that the ash does not fuse.

(d) Protein Content

The amount of soluble protein shall be ascertained by multiplying the amount of nitrogen present (other than ammoniacal or nitric nitrogen, if any) by 6.25.

FOURTH SCHEDULE

Grade Designation Mark

The mark hereunder shown shall be a grade designation mark when used in association and with the words "Empire Buying Begins at Home."