COLOUR OF PAKISTAN WOOLS

MUKHTAR AHMAD NAQVI and JAMIUL ISLAM

Department of Marketing Intelligence and Agricultural Statistics, Government of Pakistan, Karachi

(Received June 28, 1967)

Pakistan annually produces about 34 million lbs water-washed wool. Of these, nearly 16 million lbs is exported abroad and the balance is utilized for home consumption. The utility of all types of wool, whether they are intended for the production of carpets or apparel, depends on the fibre characteristics. Of these, colour is very important and on this depends the quality and price of the fibre to a large extent. As it is well known, white wool fetches the maximum price (they can be dyed into any colour) and grey and black the lowest price (they have limited colour utility). Colours like yellow and pale yellow occupy an intermediate position in respect of both quality and price. In this paper an attempt has been made to classify Pakistan wools on the basis of different colours, and to suggest lines along which the production of coloured wools can be minimized.

Material and Methods

Representative sheep of different breeds/types were selected in their habitats and their fleeces removed in one piece. Such fleeces were brought to the Wool Test House, Karachi in dust and moisture-proof containers and subdivided into wools of different colours. The amount of fibres of different colours was determined on weight basis. The percentage of colours for body wool and skirtings were first determined separately and then weighted averages drawn for the whole fleeces on the basis of the weights of body wool and skirtings.

The bales of wool graded and tested for export at the Karachi Wool Test House during the 5 years ending 1961-1962 were classified into different colour categories to determine the percentage of different colours of wool, weighted averages being drawn in all cases.

Test Results

The colours of wool of different breeds/types are shown in Table 1. Only one specimen belonged to East Pakistan, and the remaining to West Pakistan.

As regards white and yellow wools, it may be stated that the spring clip is all white, and the autumn one all yellow (from the same animals). The yellowness is due to heat and perspiration, particularly during rainy season when the wool is moist.

TABLE 1.—COLOUR OF WOOL OF DIFFERENT BREEDS/TYPES.

Breed/type	Fleeces tested	Fibres of different colours in fleeces		
		White/yellow %	Grey %	Black %
East Pakistani	14	44.8	50.8	4.4
Baluchi	37	90.0	8.0	2.0
Bibrik	11	100.0	—	—
Buchi	11	99.4	0.2	0.4
Cholistani	10	95.1	1.8	3.1
Damani	9	97.2	2.8	—
Dumbi	16	99.6	—	0.4
Harnai	18	94.3	5.7	—
Hashtnagri	6	87.1	—	12.9
Kajli	12	100.0	—	—
Kooka	4	94.4	5.6	—
Latti	10	99.5	—	0.5
Lohi	14	98.4	1.2	0.4
Michni	6	97.5	2.5	—
Rakhshani	11	96.5	3.3	0.2
Thalli	10	89.8	3.4	6.8
Waziri	8	91.7	7.7	0.6
Average:		92.1	5.5	2.4

As yellowness of wool also reduced its price, it is desirable to organize researches and determine the actual causes of this colour, so as to eliminate it from the autumn clip, as far as possible. Alternatively, cheap chemical methods of changing yellow wool to white should be found. The present chemicals used for bleaching yellow wools are very costly. As regards grey and black wools, their colour is due to the presence of pigments like melanin in the fibre cells. Such colours can be minimised by selective breeding of sheep. At present the vast majority of sheep in the country have coloured extremities, whenever such wool comes. Consequently, if sheep breeding operations are controlled, the production of coloured wool can be eliminated or minimised in a few years. A few breeds which have coloured bodies will ofcourse continue to produce grey and black wools.

The colour classification of carpet wools is shown in Table 2.

The percentage of white, pale yellow, yellow, light grey, dark grey, and black wools average 51.2, 18.5, 24.0, 5.0, 1.2, 0.1% respectively. Colours like light brown, dark brown, reddish brown etc. are all treated as grey for purposes of the grades just mentioned. During the recent years, there has been a tendency to pack more

TABLE 2.—COLOUR OF WOOL GRADED FOR EXPORT.

Year	White %	Pale yellow %	Yellow %	Light grey %	Dark grey %	Black %
1957–58	53.6	9.8	33.2	3.0	0.3	0.1
1958–59	53.6	9.0	33.8	3.0	0.4	0.2
1959–60	50.0	17.0	26.3	5.5	1.1	.01
1960–61	49.8	24.9	15.9	7.5	1.8	0.1
1961–62	48.9	31.9	10.7	6.1	2.4	–
A verage	51.2	18.5	24.0	5.0	1.2	0.1

wool under pale yellow colour, in view of its better price as compared to the yellow wools. Such packings are made by mixing white in yellow wools in small quantities. It may be mentioned that at present the fleeces are not separated for colour at the time of shearing sheep and as a result body wool (generally white) and skirtings (generally coloured) get mixed up and it is very difficult to take out all coloured wools later. Consequently it is desirable to introduce a system of sorting fleeces into body wool, skirtings and coloured wools at the very time of shearing.

Acknowledgements.—The authors are indebted to the Agriculture Council of Pakistan for granting funds for field investigations; to the Wool Test House, Karachi, for the figures of graded wool, to Dr. I. Haq, Dean faculty of Animal Husbandry, W.P.A. University, and Mr. A.M. Chaudhri, Agricultural Marketing Adviser, Govt. of Pakistan for guidance in the work reported above.

A NEW SIMPLE METHOD FOR PROTECTING RICE AGAINST RICE WEEVIL (SITOPHILUS ORYZAE)

A. EHSAN

Industrial Liaison Cell, West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received January 29, 1968)

For the protection of foodgrains against the attack of pests during storage, the use of chemicals such as HCN, CH_3Br, DDT, Lindane, Pyrinthrins, CH_2Cl_2 and CCl_4 has been recommended.[1] The gaseous chemicals are most commonly used. Unhulled rice stored in concrete silos is safe from the attack of pests, but requires far more space for storage. Polished rice is commonly attacked by rice weevil.[1] Since most of the chemicals commonly used are not produced in the country, efforts were made at these laboratories to explore the possibilities of using indigenous sources for protecting food grains on storage.

Vegetable oils, condiments and barks of certain trees were used for protecting polished rice on storage. Vegetable oils and condiments gave limited protection but barks of eucalyptus, cinnamon and bakayan (*Melia azedarach*) were very effective. Of the three barks, corky and rough barks of the bakayan and eucalyptus trees have given remarkable results.

When a few pieces of bakayan or eucalyptus tree bark are placed in a bag of rice, the weevil is attracted towards it. Twenty-four hours after inserting the bark in a bag of rice, almost all the weevil is found on the bark. The bark can be cleaned and put back in the bag. Even if the bark is not removed for cleaning the weevil seems to remain around the bark and is not found in other part of the bag.

Bakayan and eucalyptus trees are abundant in West Pakistan.

Acknowledgement.—The author is grateful to (late) Mrs. Shamim Ehsan for suggesting the problem and for conducting some experiments at the household level.

References

1. *International Rice Institute Bibliography* (Scarecrow Press, New York, 1953).

GALVANIC INFLUENCES IN BLOATING OF FIRED CERAMICS

M. SAFDAR

Glass and Ceramics Division, West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received July 23, 1965; revised January 1, 1968)

During the last decade the concept that the corrosion of refractories in glasses and slags is at least partially galvanic in character has been gaining ground. This is largely a consequence of the atomistic approach of Weyl[2,3] to the acidity–basicity concept. The concept of the 'screening' demand of the cation is the basis of this interpretation. If a solid contains cations which are insufficiently screened and another solid contains cations which are better screened, the two may react and form a compound. In their reaction the solid with the greater demand for screening acts as the 'acid' and the one with the lesser demand acts as the 'base'. Salt formation will then consist of an interaction in which the highly

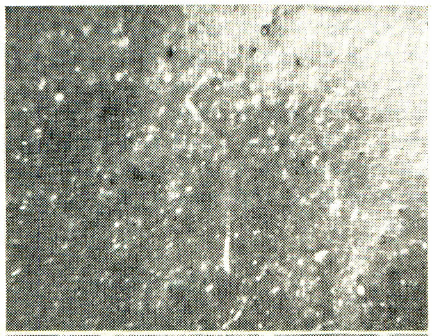

Fig. 1.

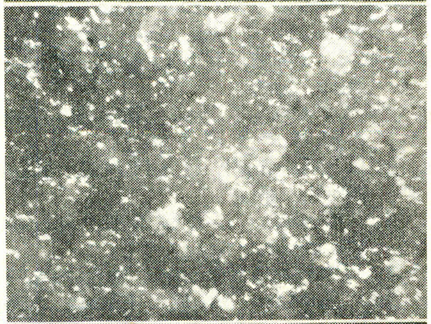

Fig. 2.

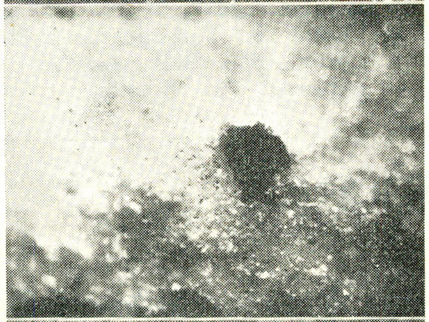

Fig. 3.

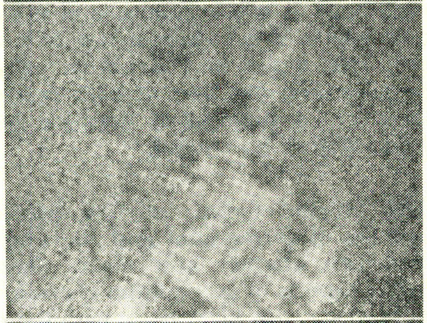

Fig. 4.

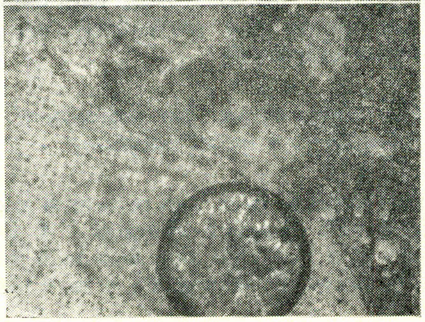

Fig. 5.

charged, poorly screened cations improve their screening by surrounding themselves with the anions which are more polarizable. This tendency to interact in a fashion which tends to equalize the screening demand of all cations of a system is postulated to exist even under conditions where salt formation does not take place. This has been demonstrated by measuring the potential differences which are set up when two phases are brought into contact. Marshall[4] has found that even solid NaCl assumes a positive charge with respect to fused salt.

According to Plumat[5] when two glasses of different acidity or a glass and a crystalline phase are brought into contact the more acid phase will attract oxygen ions or electrons from the better screened phase. Plumat[6] has also shown that the magnitude of difference of potentials observed in the cell Pt/glass/glass+oxide/Pt is proportional to the charge of the cation of the added oxide and inversely proportional to the square of the distance between the centres of the cations and the oxygen ions coordinated with it. The evolution of gas has been observed by Plumat[5] when platinum wires immersed in glass are connected in short curcuit. He believes that the gas formation is an indication that a current passes in the cell and an electrochemical process takes place. Safdar[7] has shown that pitting in a pure alumina refractory when immersed in a melt is caused by gas evolved in an electrochemical reaction. The bubble formation in glass has also been recently shown by Plumat[8] to be due to an electrochemical effect.

Bloating is a phenomenon commonly observed in fired ceramics, and is very much objectionable. The most commonly ascribed cause is the evolution of dissolved gases. Very little attention has, however, been given to the galvanic influences governing the phenomenon.

Experimental and Discussion

In a recent investigation[1] on acid-proof bricks of the clay–feldspar–quartz type, bloating was observed in certain bricks fired at 1250°C for 1 hr and more. A micrographic study of these bricks was, therefore, made in an attempt to understand the phenomenon. The example shown is a brick of composition 55% clay, 25% quartz, and 20% feldspar. Figures 1 and 2 show the surface on firing at 1250°C for 1 and 2 hr respectively. The surface in Fig. 2 can be seen to be bloated and rough.

Bricks were broken to examine the internal structure. Most of these samples were found to contain pin-holes. A typical pin-hole is shown in Fig. 3. In addition to the large pin-hole in the centre of this micrograph a number of minute holes are also evident in the left-hand bottom corner. These are evidently in the early stages of formation.

The pin-hole formation is believed to be due, at least partly, to a galvanic process. During firing in a clay–feldspar–quartz mixture, the feldspar grains melt at about 1140°C but because of its high viscosity feldspar begins to react only above 1200°C. Around 1250°C the feldspar interacts with clay, forming mullite and glass. With prolonged heating at 1250°C in the present case the glass would tend to dissolve the quartz phase. At the same time mullite crystals would tend to grow in glass. There is thus a possibility of electrochemical gas evolution between the mullite–glass system on the one hand and the glass-quartz system on the other. Also, since these two phenomena are taking place simultaneously, the glass in adjacent regions might differ in composition, and one composition is likely to behave as an acid in relation to the others, thereby causing gas evolution. This view is supported by Fig. 4 showing concentration of the glassy phase around the crystalline phase.

Figure 5 shows a thin section of a bloated brick. The crystalline phase can be seen on the right side and the glassy phase on the left. The circular patch in the lower left is apparently a minute crystalline mass engulfed in the glassy phase. The dark band surrounding the circular mass apparently is the void caused by the gas evolved during interaction of the glass and crystal phases.

References

1. M. Safdar, M.S.Y. Bhatty and M.A. Naz, Pakistan J. Sci. Ind. Res. (in press).
2. W.A. Weyl, U.S.O.N.R. Report No. 52, July, 1952.
3. W.A. Weyl, J. Soc. Glass Technol., **35,** 421 (1951).
4. A.C. Marshall, U.S.O.N.R. Report No. 48, April, 1952.
5. E. Plumat, U.S.O.N.R. Report No. 52, December, 1954.
6. E. Plumat, Silicates Ind., **19,** 141 (1954).
7. M. Safdar, Ph.D. Thesis, University of London (1961).
8. B. Boffe, F. Toussaint and Plumat, Am. Ceram. Soc. Bull., **44,** (4), 403 (1965); (Abstract No. 8-53-65).

BOOK NOTICES

Germanium. V.I. Davydov. Gordon and Breach, New York.

This book of four chapters is very well written and would serve the purpose of the research workers and technologists equally well. The applications of Germanium are fairly wide and the metal has become the most important among the less common elements. The compilation of the various aspects of Germanium chemistry was therefore a wise step.

The first chapter on the importance and uses of germanium in technology is too concise. A book of this size should have been a bit more liberal in describing the role of the metal and its compounds in greater detail. This is particularly desirable in this book which lists mostly Russian references that are not easily available.

The introduction of minerals and ores of germanium as a separate chapter is a neat method of organizing the subject matter. This chapter has been handled well. The third chapter on "Raw material sources and methods of production of germanium" is fairly comprehensive and suits the requirements of the chemists as well as technologists. The topics on "Recovery of germanium from coals and Products of their processing" and "Recovery of high-purity metallic germanium" provide interesting reading.

The fourth chapter on the physicochemical properties of germanium and its compounds is a well-written chapter and covers almost all the physical aspects of germanium chemistry. Justice has, however, not been done with the compounds of germanium and particularly the organogermanium compounds.

The appendix on the radioactive isotopes of germanium is a useful addition.

The book has been well presented and would be liked by all inorganic chemists. As pointed out earlier, the book has one drawback that it does not list accessible references, so much so, that the