ADDENDUM TO AGENDA

For BIS Use Only

BUREAU OF INDIAN STANDARDS

Textiles Speciality Chemicals and Dyestuffs Sectional Committee, TXD 07 **22nd Meeting**

Date/ Time	**Venue**
Tuesday, 12 November 2024, 1100 h	Through CISCO Web Ex

2.2 Co-option requests have been received from Dr. Suresh Sundaramurthy, Department of Chemical Engineering Maulana Azad National Institute of Technology Bhopal and Shri R. Madhan, Individual Capicity. The cooption mails, CVs and other details as received are given in **Annex 8** (P- 08 to 16).

2.2.1 The committee may **NOTE** and **DECIDE**.

ITEM 10 COMMENTS ON REVIEW OF STANDARDS

10.1 As decided by the committee in the last meeting, the following standards were circulated to the respective members for reviewing thoroughly by the experts of relevant field in today's context , to suggest suitable modification/changes.

Additional Comments have been received from Shri Arindam Chakraborty, Atul Ltd, Gujarat and Shri Bosco Henriques, Bio Dyes, Goa on the following standards:

Sl. No.	IS Number	Title	Comments From
	IS 4360: 2020	Method for determination of strength of fast bases	Atul Ltd, Gujarat
	IS 4459: 2020	Method for determination of strength of direct dyestuffs by dyeing test	-do-
	IS 7845: 2020	Textile Dyestuffs - Method for Evaluating Strength of Reactive Dyes (Trichloropyrimidyl Type) by Dyeing Test (First Revision)	-do-
	IS 17430 : 2020	Textile Dyestuffs — Natural Dye from Red Flowers of Canna indica (Indian Shot, Sarvajjaya) — Identification	Bio Dyes, Goa

	IS 17431 : 2020	Textile Dyestuffs — Natural Dye from Red Flowers of Impateins balsamina (Balsam, Gulmehndi) — Identification	-do-
	IS 17432 : 2020	Textile Dyestuffs — Natural Dye from Tectona grandis (Sagaun) Leaves — Identification	-do-
	IS 17433 : 2020	Textile Dyestuffs — Natural Dye from Terminalia arjuna (Arjun) Bark — Identification	-do-

The Comments as received is given at **Annex 9** (Pages 17-37).

10.1.1 The committee may **DELEBRATE** and **DECIDE**.

ANNEX 8
(*Item* 3.2)

CO-OPTION REQUEST FROM DEPARTMENT OF CHEMICAL ENGINEERING MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY BHOPAL

CURRICULUM VITAE
SURESH SUNDARAMURTHY, PhD (SURESH S.)
October 2024

EDUCATION AND WORK EXPERIENCE

PhD (Chemical Engineering), Indian Institute of Technology Roorkee, 2010
M.E (Chemical Engineering), Annamalai University Tamil Nadu, 2006
B.Tech (Chemical Engineering), Pondicherry Engineering College, Pondicherry University, 2004
P.G. Diploma (Industrial Safety) Annamalai University, Tamil Nadu (Distance Course), 2005
Head of the Department, MA-NIT Bhopal (April 2024-Present)
Associate Professor, MA-NIT Bhopal (December 2023-Present)
Convenor & Faculty In-charge: Central Research Facility, MA-NIT Bhopal (2019-Present)
Head of the Department, MA-NIT Bhopal (January 2019-October 2019) Departmental Coordinator, MA-NIT Bhopal (July 2013-January 2016) Assistant Professor, MA-NIT Bhopal (August 2010-December 2023)
Postdoctoral Researcher, Centre for Discovery & Innovation, CUNY USA (2017-2018)
Visiting Faculty, Asian Institute of Technology Thailand (January-May 2016)
Visiting Fellow, International Centre for Mater. Sci., JNCASR Bangalore (Dec. 2011-Feb. 2012)
Research Fellow, Indian Institute of Technology Kanpur (February-July 2007)
Research Fellow, Pollution Control & Energy Technol., Pondicherry University (June 2006-Jan. 2007)

PATENTS, AWARDS, AND HONORS

Indian Patent: Silica-Titanium Dioxide doped Photocatalyst, and a Reactor Vessel for Effluent Treatment. Indian Patent No. 1599/MUM/2015 dated 18/04/2015 and Published on 21/10/2016 in The Patent Office Journal Issue No. 44/2016 (Applicant: MA-NIT Bhopal, Inventor: S. Suresh)
Indian Patent: Pyrolysis system for thermal decomposition of biomass (Inventors: Ajoy Debbarma & Suresh Sundaramurthy; Applicants: Rain Forest Research Institute, Jorhat (Assam) & Maulana Azad National Institute of Technology Bhopal), Design No. 375152-001 dated 25.01.2023.
Indian Patent: Edible coating composition and the method of preparation thereof (Inventors: Surinder Singh, Daijit Kaur, Suresh Sundaramurthy, Raj Kumar, Sushil Kumar Kansal; Applicants: Panjab University, India; and Maulana Azad-National Institute of Technology Bhopal). Application Number-202311010558, Filing Date-16/02/2023. Published; 26/2023 dated 30/06/2023
Indian Patent: Carbon Doped Silica-Nanostructured Cu/CuO catalyst for plasma conversion of CO2 to CO. (Applicants: MA-NIT Bhopal & ONGC Energy Centre Trust, New Delhi, Inventors: Suresh Sundaramurthy, Sasikumar Chandrabalan, Jyoti Verma, Komal Singh, Ravi), Patent Application no. 20231101572, Filing Date-9/03/2023
Indian Patent: IoT device for measuring water pollutants Level. Sapana Madan, Suresh Sundaramurthy, T. Kumuthavalli, Meenakshi K, Ashish Kumar Ratha, Anju, Manasi Vyankatesh Ghamande, Jigneshkumar Amathalal Chauhan. Application No. 427239-001. Filing Date-16/08/2024
Indian Patent: A process to convert Necromass residual biomass to biochar using indigenously

designed double barrel Pyrolysis device (Inventors: Ajoy Debbarma & S. Suresh)
Indian Patent: Novel plasma reactor for CO conversion. Under review (Applicant: MA-NIT Bhopal & OECT (ONGC Energy Centre) New Delhi, Inventors: S. Suresh and C. Sasikumar), 2022.
Indian Patent: Wastewater treatment and Energy generation through MFC using Nanoelectrodes Under review (Applicant: MA-NIT Bhopal, Inventors: S. Suresh and Samatha Singh), 2022. Under process.
Technology synchronized & commercialization in progress: "Liquid biofertilizer via aminoacid from cowdung and human hair" with Bhopal Municipal Corporation (Nagar Nigam).
Principal Advisor: WTL-Clean & Renewable Energy Pvt Ltd (USA)
Fellow Member: Society of Energy Engineers and Managers, India
Certified Renewable Energy Professional Preparatory Training: Association of Energy Engineers (AEE), USA, 2017 (Preliminary)
SERB Indo-US Postdoctoral Research Fellowship: Science and Engineering Research Board (SERB) and Indo-US Science and Technology Forum (IUSSTF), Department of Science and Technology, Government of India, Fulbright House, New Delhi, July 2016.
Bharat Excellence Award: Friendship Forum, New Delhi, August 2016.
Best Poster award: in the 103rd Indian Science Congress, University of Mysore, 3-7th January 2016.
4th IGCW-2015 award in the Knowledge Community & Academic Research category: Industrial Green Chemistry World (IGCW 2015), organised by Green ChemisTree Foundation, Mumbai, India, December 2015.
Short term Visiting Faculty: Ministry of Human Resource Development, Department of Higher Education, Government of India, August 2015.
IEI Young Engineers Award: Institute of Engineers, Kolkata, India, August 2015.
Rashtriya Gaurav Award: India International Friendship Society, New Delhi, 2015.
Award of Member: National Innovation Club by Rashtrapati Bhavan-The President of India, New Delhi, March 2015.
Prof R C Singh Memorial Medal: 28th Indian Engineering Congress, Institution of Engineers India (IEI), 2013.
Visiting Research Fellowship: Jawaharlal Nehru Centre for Advanced Scientific Research, International Centre for Materials Science, Bangalore, Dec. 2011-Feb. 2012.
Young Scientist Award by Government of Uttarakhand, 2009
Junior and Senior Research Fellowship: Ministry of Human Resource Development (MHRD), Department of Education, Government of India, New Delhi, July 2007-July 2010.
Best Fielder in the cricket (sport club): Association of Chemical Engineering Students, Pondicherry Engineering College, Puducherry, 2004.
Best Performer Award: Association of Chemical Engineering Students, Pondicherry Engineering College, Puducherry, 2003-2004.
Winner-up Cricket Team Shield: Pondicherry Region Zonal Level–Schools Games and Athletics Competitions (IV-Zone), conducted by Education Department, Government of Pondicherry,

Puducherry, 1997-98.

PROJECT FUNDING (RESEARCH<CONSULTANCY<OTHER)

R&D Project: Treatment of industrial wastewater using sequential batch reactor (SBR) - 45 Lacs, MHRD (Grant-Aid-Scheme), 2010-2012.
R&D Project: Extraction of fibres from raw sisal plants-15.45 Lacs, Handloom and Handicraft Rural Development Department, Government of Madhya Pradesh, 2011-2013.
R&D Project: Development of Novel separation Processes, MHRD-MANIT Bhopal-50 Lacs, 2011- 2012.
R&D Project: Treatment of industrial wastewater using photocatalysis process, MPCST, MP Govt.- 5.45 lacs, 2012-2015.
R&D Industrial Project: Treatment of brine sludge using combined adsorption-Electro-chemical methods, TEQIP & Grasim Industry, Nagda, Madhya Pradesh, 14.45 lacs, 2012-2015.
R&D Project: Machining and analysis of various parameters of nanocomposites prepared from industries wastes for various applications, MPCST, MP Govt, India-5 lacs, 2015-2017.
R&D Project: New carbon-based nanocomposites (biochar) from waste biomass and carbon cloth: Experimental and modelling studies to adsorption of H2S, HCHO from air, sensing of H2S and ammonia gases, and photo-oxidation/CO2 reduction. SERB/IUSSTF, DST, 40000USD, 2016-2018.
R&D Project: Selective Conversion of CO2 to CO using an Inexpensive Nano-porous carbon doped oxides through plasma/photocatalysis, ONGC Energy Centre, New Delhi-14.86 lacs (2016-2018).
R&D Industrial Consultancy Project: Adequacy and Performance Assessment of Existing Effluent Treatment Plant, GAIL (India) Limited, Madhya Pradesh-11.80 Lacs (January 2019-June 2019).
R&D Project: Process optimization indigenously developed catalysts in plasma assisted photo-catalytic reactor and regeneration of catalysts, ONGC Energy Centre, New Delhi-10.6375 Lacs (2019-2021).
R&D Project: Development of process and technology for value added products from segregated biocrude (in collaboration with Central Institute of Agricultural Engineering Bhopal), Ministry of Agriculture. (April 2019 to July-2022). 60 Lacs.
R&D Industrial Project: Water Quality monitoring and assessment of Central Effluent Treatment Plant (CETP), Indore, Madhya Pradesh-22 Lacs (2021-July 2022).
R&D Industrial Project: Strategical survey and assessment of air pollution in the non-attainment cities of Madhya Pradesh, India sponsored by M/s Center for Study of science, Technology and Policy, Bangalore-560094, Karnataka. 23.5 Lacs. 2021-2022.
R&D Project: Development and optimization of bio-char enriched super compost from forest necromass for enhanced soil carbon sequestration, MoES, India- 16.494 lacs collaboration with Rain Forest Research Institute, Jorhat, Assam (2018-May 2023).
R&D Consultancy Project: Environmental Monitoring of quality of Surface water, Ground water, Soil, Air & Noise around Mahakal Temple Ujjain at regular interval. Ujjain Smart City Limited. 29.4 Lacs. 2022-2023.
Consultancy work: Chemical analysis of biochar and dental materials. M/s Anant Urja Pvt Ltd, Bhopal. 0.1955 Lacs, 2019.
Consultancy work: Testing of iron bars, M/s Bansal Industries, Bhopal. 0.59 Lacs. 2023
Consultancy work: Chemical analysis of TMT Fe500, M/s NTPC Khargon. 0.385 Lacs. 2023
Consultancy work: Vetting of hydraulic design and drawings of various components. M/s LCC Project Ltd, Gujarat. 14.9624 Lacs. 2023
Consultancy work: Testing of wood waste to know ratio of carbon and oil. M/s GCM Carbon Pvt. Ltd, Raisen, Madhya Pradesh. 0.3 Lacs. February, 2024
Consultancy Project: Source Apportionment of PM2.5 & PM10 of Jabalpur City for Identification of Major Sources, Jabalpur Municipal Corporation under National Clean Air programme (NCAP) scheme, MoEF &CC, GoI-93.88 Lacs. 2022-2024. Ongoing.
Consultancy Project: Source Apportionment of PM2.5 & PM10 of Ujjain City for Identification of Major

Sources, M.P. Pollution Control Board under National Clean Air programme (NCAP) scheme, MoEF &CC, GoI-68.73 Lacs. 2023-2025. Ongoing.
R&D Project: Development of Carbon Nanofiber Materials From Cow-Dung/Bio-Sludges for Smart Fabric Textile and Selective CO2/H2 Energy Storage Applications (in collaboration with CSIR-AMPRI Bhopal). NTTM, Government of India. 77 Lacs. 2023-2025. Ongoing.
R&D Project: Identification and treatment study of heavy metals and chlorinated by-products using fish scale morphological changes with sedimentation analysis for Upper Lake of Bhopal. MPCST. 9.22 Lacs. 2023-2024. Ongoing.
R&D Project: Enhanced selective recovery of selenium and tellurium from copper anode slime using secondary mineral waste. 32 Lacs. 2024-2027. Ministry of Mines, Government of India. Ongoing.
R&D Project: Enhance Air Quality through Source Apportionment of PM2.5 & PM10 of Dewas City for Identification of Major Sources, Dewas Municipal Corporation under National Clean Air programme (NCAP) scheme, MoEF &CC, GoI-Rs.81,87,725 Lacs. 2024-2026. Ongoing.
R&D Project: Enhance Air Quality through Source Apportionment of PM2.5 & PM10 of Sagar City for Identification of Major Sources, Sagar Municipal Corporation under National Clean Air programme (NCAP) scheme, MoEF &CC, GoI-Rs.98.13,225 Lacs. 2024-2026. Ongoing.
R&D Project: Integrating Vastu and Sustainability in Indian Temple Architecture: A Synergy between Ancient Wisdom and Contemporary Modernism. Indian Council of Social Science Research, Govt. of India. Grant No. ICSSR-VB2024-1049. Rs.20,67,600. 2024-2025. Ongoing.
Consultancy Project: Municipal Solid Waste Quantification, Composition and Characterization study at Ujjain. Ujjain Smart City Limited (USCL) under CITIIS 2.0 scheme. Rs. 18,43,750/-. September,2024 Ongoing.
Consultancy Project: Vetting of sewerage DPR for ward No. 1 to 60 of Gwalior City. Rs.. 17, 70,000/-. October, 2024. Ongoing.
R&D Project: Pilot plant for hydrogen generation from biomass char through steam gasification and its storage by nanocarbon integrated metal hydride composite (in collaboration with Central Institute of Agricultural Engineering Bhopal). Rs. 2.59 Crore. DST. Submitted. 2024
R&D Project: Synthesis of bio-derived high porous carbon-MOF composite for advanced hydrogen storage applications (in collaboration with Central Institute of Agricultural Engineering Bhopal). MNRE, Government of India. 1.0453 Crores. April, 2024. Submitted.
R&D Project: Advanced Numerical Modelling and Additive Manufacturing of Acoustic Metamaterials for Aeronautical Noise Reduction. Aeronautics Research & Development Board, DRDO. Submitted, 2024. Total budget: 95.97 Lakhs
R&D Project: Technical Textiles and Management Centre of Excellence, National Technical Textile Mission (NTTM), Ministry of Textile, Govt. of India. Total budget: 342.788 Lakhs. Submitted, 2024.
R&D Project: Development of lightweight greenhouse gas sensors for Atmospheric Science studies. ISRO. Rs. 19,75 Lacs. Submitted. August 2024
R&D Project: Pollution to Solution Integrated Carbon Capture and Utilization in the Cement Industry. Rs. 47,00,000. DST. Submitted.
R&D Project: Development of high energy Graphene/Borophene based Self-Powered Piezoelectric/Triboelectric Nanogenerator Integrated Energy Storage Devices (in collaboration with CSIR-AMPRI Bhopal). DST, Government of India. Rs.98,25,336/-. July 2024. Submitted.
R&D Project: Development of process and technological package for effective use of Agro-residues and Municipal Solid waste and with Coal in Thermal Power Plants. Rs.53,67,648/- Submitted to Central Power Research Institute. August 2024.
R&D Project: Development of a novel solar dryer based on Nano-enhanced Phase Change Material as thermal storage for agricultural-based food applications. Submitted to DST. Rs. 48,35,480/- October 2024.
R&D Project: Design of Emergent van der Waals Heterostructure for High performance and Flexible Optoelectronic Devices. Submitted to DST. Rs. 1,37,67,962/-October 2024.
R&D Project: Cost-effective process for energy production and energy saving materials from MSW waste

plastic and pine litter. Submitted to NMHS, MoEF&CC. Rs. 137.54 Lacs. October, 2024

TEACHING AND RESEARCH GUIDANCE

Chemical Reaction Engineering, Process Dynamic and Control, Bio-energy Engineering, Biochemical Engineering, Bioprocess Engineering, Green Technology, Environment Pollution Control, Process Safety and Disaster Management, Advance Separation Processes.
Supervisor and co-supervisor for about 250 (B.Tech students + project students); 66 M.Tech scholars and 08 PhD scholars
List of Ph.D. Thesis topics:
Rajesh Babu Katiyar, Optimization of Engineering & Process Parameter for Vermi-composting. Co-Supervisor: Dr. A.K. Sharma
Kamlu Ram Gota, Study of Photocatalytic degradation of Phenolic Wastewater
Saraswati Rana, Treatment of Phenolic and Textile wastewater by using Biological and Physicochemical Methods
Rajani Bharati, Synthesis of Nano-catalysts for Treatment of Petroleum Refinery Wastewater
Anuj Kumar Verma, Synthesis, characterization and application of fly ash based filler and pigment for paper industry. Co-Supervisor: Dr. Dinesh Mohta
Anshika Rani, Experimental and Computational investigation of hybrid single slope solar stills. Co-Supervisor: Dr. Anil Kumar
Samatha Singh, Development of low-cost microbial fuel cell for energy generation from wastewater
Satyam Mishra, Multicomponent adsorption of nitrate and associate ions from aqueous solution. Co-Supervisor: Dr. MS Chauchan
Abhishek Mathur, Development of graphene based nanocomposite for environmental application (in progress)
Rakesh Kumar Chand, Air Pollutions Modelling and their source appointment study in the Ujjain City. Co-Supervisor: Dr. A.K. Sharma (in progress)
Manoj Kumar Gandwane, Pollution abatement through membrane technology. Co-Supervisor: Dr. V.K. Bulasara (in progress)
Jyoti Verma, Policy Evaluation and Performance Assessment for Clean and Green Sustainable energy Practices (in progress)

List of completed and Ongoing M.Tech. Thesis:

S.No.	Name of students	Title of thesis	Year of Award	Name of Co-Supervisor
1.	Piyush Pratap Singh	Optimization of 1-2 Propane, diol using Box Behnken Design	2014	Dr C. Sumana, IICT Hyderabad
2.	Satyendra Singh	Kinetic study of esterification with ethylene glycol & acetic acid in presence of Para toluene sulphonic acid	2014	Dr. K. Yamuna Rani, IICT Hyderabad
3.	Shashank Tiwari	Simulation of postulated methanol pool fire in a nuclear fuel sub-assembly cleaning facility	2015	-
4.	Goldy Shah	Removal of petroleum hydrocarbon from different oily sludge by various treatment methods	2015	Prof. Amit Dubey

5.	Mona Sakena	Adsorption of phenol onto waste granular activated carbon from water purifier cartridge: Batch and Column study	2015	-
6.	Sanjay Singh	Simulation of different type of distillations columns for production of Methy-Tert-Butyl- Ether by using ASPEN Plus software	2015	-
7.	Anil Kumar	Photodegradation of phenol, catechol and hydroquinone pollutants from aqueous solution	2015	-
8.	Sharad Suryawanshi	Removal of zinc onto synthesised zeolite from aqueous solution	2015	Prof. A.K. Sharma
9.	Swati Rawat	Fly ash: A suitable material for warm based technology	2015	Prof. A.K. Sharma
10.	Shivali Sahota	Biological pre-treatrment of water hyacinth for biogas production	2015	Dr. Khushali Meneria
11.	Mohit Jain	Preparation of rubber-sisal fibre nano composites	2015	Dr. M.K. Pradhan
12.	Khusboo Kumari	Hybrid anaerobic digestor with MFC	2016	-
13.	Kuldeep Sahu	Design of RBC for degradation of wastewater	2016	-
14.	Snigdha Mandal	Design of controller for MFC and Pipeline corrosion system	2016	-
15.	Deepak Rangare	Synthesis of DMC additives by using carbon based nanocatalyst for fuel application	2016	Prof. Amit Dubey
16.	Ashwin Kumar	Design of controller for solar dryer	2016	-
17.	Krishna Kumar P	Modelling of Pyrolysis Process for Thermochemical Conversion of Human Hair to Biofuel	2016	Prof. Prashant Baredar
18.	M.K. Faheema	Inherent radiant heat exposure protection in a tank farm	2017	Dr. Bharat Modhera
19.	Neha Maheshwari	Preparation of ceramic membrane based on fly ash for oil-water emulsion separation	2017	Dr. C. Sasikumar
20.	Kunjan Junghare	Carbon sequestration followed by micro algae via biodiesel production	2017	Prof. Prashant Baredar
21.	Nikhil Kumar	Selective conversion of CO2 to CO using an inexpensive nanoporous CeO2 doped with SiO2 through thermal/plasma photocatalysis	2017	Dr. C. Sasikumar
22.	Prashant Srivastava	Treatment of Diary Wastewater through RBC	2018	Prof. A.K. Sharma
23.	Mayank Raguwanshi	Process optimization of CO2 conversion through developed indigenously plasma assisted	2019	-

		photocatalysts		
24.	Niteesh Singh	Removal of fluoride from drinking water by using adsorption process	2019	Prof. Mukul Kulshrestha
25.	Sanjeev Verma	Production of biogas from water hyacinth and parthenium hysterophorus	2019	Prof. Prashant Baredar
26.	Anoop Meleri	Optimization and process parameters of CO2 conversion using Plasma assisted photocatalyst system	2020	-
27.	Preety Kumari	Biosynthesis catalysis for sonocatalytic technology	2020	-
28.	Sujit Das	Fractional distillate products and Value added chemicals from Biocrude	2020	-
29.	Saurabh Jain	Adsorption of Fluoride through water hyacinth adsorbents	2020	Prof. Mukul Kulshrestha
30.	Sandeep	Rheology properties of different liquid streams	2020	Dr. H.L. Tiwari
31.	Kapil Newar	Microreactor with Microbubble mechanism	2021	Dr. Rajeev Parmar
32.	Anjali Prasad	Adsorptive removal of Hexavalent Chromium by Cupric oxide-impregnated Sugarcane Bagasse	2022	Dr. Sunder Lal Pal
33.	Archa S Vasanthan	Column Adsorption study of Carbon dioxide using carbon aerogel prepared from waste tissue paper and polyvinyl alcohol	2022	Prof. MS. Chauhan
34.	Haroon Haridas	Adsorbent development is a solution for waste mattress disposal: characterisation and performance evaluation for sulphate ion adsorption	2022	Prof. MS. Chauhan
35.	Nihar	Adsorptive removal of Eriochrome Black T dye using Tin Oxide loaded walnut shell activated carbon	2022	Prof. MS. Chauhan
36.	Utkash Baranwal	Utilization of brewery spent grain into value added products through ultrasonic assisted extraction technique	2022	Prof.A.K. Sharma
37.	Sagar Tapdiya	Modelling and Simulation of multiple slope solar dryer	2022	Prof. Prashant Baredar
38.	Priya Singh	Biochemical characterization of phytochemicals from Eucalyptus and cinnamon plants	2022	Dr. Khushali Meneria
39.	Kajal Tiwari	Conversion of agrowaste residue into sodium silicate: Green Route towards	2023	Dr. H.S Kaur

		pollution abatement		
40.	Meenu Singh	Preparation of Nano Scale Activated Corn Based Biosorbent For Efficient Removal of Hydroxychloroquine	2023	Dr. H.S Kaur
41.	Dr. Aiman Haider	A Comparative evaluate the remineralizing effect of dentifrices on eroded primary teeth enamel by two pediatric liquid medicaments through scanning electron microscope: An in-vitro study	2021	Dr. Babita Niranjan
42.	Dr. Priyanka Khadatkar	A Comparative evaluation of fluoride release and rechargeability in conventional GIC (Type II), pediatric GIC (Type IX), and Cention-N: An in-vitro study	2022	Dr. Babita Niranjan
43.	Dr. Pragya Kumari	Comparative evaluation of microleakage of two different types of restorative materials in primary and permanent posterior teeth: An invitro-study	2022	Dr. Arpana Bansal
44.	Dr. Jyoti Sarathe	Comparative evaluation of surface hardness and surface roughness of heat polymerized polymethyl methacrylate acrylic resin immersed in different disinfectant solution: An invitro-study	2022	Dr. G.S. Chandu
45.	Mohini	Utilization Of Waste Diaper, Paddy Straw And Saw Dust for Oyster Mushroom Cultivation: A Solution Towards Sustainable Development	2023	Dr. H.S Kaur
46.	Harisahmad	Adsorption of sulphide ion onto activated waste cloth from aqueous solution	2023	Dr. H.S Kaur
47.	Ayush Singh	Comparison of Different Models for Estimation of Monthly Solar Radiation at Bhopal, M.P. (India) Region	2023	Prof. Prashant Baredar
48.	Sheetal Mathur	Environmental impact assessment of carbon-based anode for sodium ion battery	2023	Prof. Prashant Baredar
49.	Aditya Kumar	Development of Bentonite based flat ceramic membrane for recovery of spent caustic from industrial green liquor of pulp and paper industry	2023	Prof. MS. Chauhan

50.	Sumit Sahu	Rick husk ash bricks stabilized with cowdung and fly ash: An eco-friendly alternative to burnt clay bricks	2023	Prof. MS. Chauhan
51.	Prakamya Tiwari	Emission inventory and quantification of air pollution load in Indore City	2023	Prof.A.K. Sharma
52.	Pranjal Parihar	Emission inventory and quantification of air pollution load in Ujjain City	2023	Prof.A.K. Sharma
53.	Prasoon Lodhi	Emission inventory and calculation of pollution load in Jabalpur City	2023	Prof.A.K. Sharma
54.	Rachana Devi	Evaluation and statistical analysis of indoor environmental quality parameters in MANIT campus, Bhopal (India)	2023	Prof.A.K. Sharma
55.	Saral Nigam	Spatial and temporal variation of NOx and SOx concentration in ambient air of Madhya Pradesh, India	2023	Prof.A.K. Sharma
56.	Nidhi Bhardwaj	Development of nano-PCM materials for thermal application	2023	Prof. M.M. Malik
57.	Praful Choudhary	Optimizing oyster mushroom cultivation for mitigating food and flora scraps	2024	Dr. H.S Kaur
58.	Kuldeep Yadav	Extraction of sodium silicate from agro waste used as coagulant	2024	Dr. H.S Kaur
59.	Shikha Shipra	Utilization of peanut hulls, disposable face masks, and wheat straw as substrate for Oyster Mushroom cultivation: A comparative analysis	2024	Dr. H.S Kaur

60.	Prashant Sompura	Synthesis and characterization of activated carbon from palash tree barks and activated carbon/metal oxide composite for supercapacitor electrode	2024	Prof. M.M. Malik
61.	Om Prabhu Buddeker	Magnetite doped nanocellulose fiber and pyrolytic carbon based triboelectric nanogenerator	2024	Prof. M.M. Malik
62.	Anchal Mishra	Estimation of Emission inventory and windrose diagram for Jabalpur city	2024	Prof.A.K. Sharma
63.	Mayank Upadhyay	Study of Road dust generation in Ujjain City for air pollution load analysis	2024	Prof.A.K. Sharma

DETAILS OF PUBLICATIONS

In Brief:

Patent published 02+04	Book series 07+10	Book chapter 27+04	Journal 120+08	Presentation/Proceedings 77+02	Invited Talk 54

A selection of recent journal publications, artistic productions, books, including book and report excerpts. See all publications in the database (Profile website: https://manit.irins.org/profile/61748) (http://scholar.google.co.in/citations?user=WgcujRQAAAAJ) & (Researcher ID: http://www.researcherid.com/rid/F-3102- 2012)

CO-OPTION REQUEST FROM SHRI R. MADHAN, INDIVIDUAL CAPICITY

Career Objective

To prove my knowledge in the areas entrusted to me and to secure a challenging position, which would enable me to integrate my knowledge and skills. Seeking a growth oriented and a challenging position in a progressive company, who honors and showcases professionalism, respect, and integrity as an integral part of their daily operations. And would like to work for a company which gives me an opportunity to prove my skills.

Academic Qualifications

- MBA (International Business Management) – 2012, From Garden city college, Pondicherry University, Bangalore, Karnataka

- B. Tech (Textile Technology) – 2006, From SSM College of Engineering, Anna University,Namakkal, Tamil Nadu

- Diploma in Handloom Technology – 2003, From Indian Institute of Handloom Technology, Ministry of Textiles, Gadag, Karnataka

Work Experience - I

- Currently working as an ASSISTANT QUALITY MANAGER in Manjushree Spntek Pvt Ltd, Bangalore from 06th July 2022 & presently working.

Job profile: Maintaining the Quality Management System, Quality of product, make everyone committed in adhering procedures and improving the quality systems.

Key Responsibilities

- Ensures that SOPs, WIs, quality systems and technical standards are in place and clearly communicated to all employees.
- Liaise for all internal/external audits, prepare the reports, and make sure the appropriate Corrective action is in place to arrest gaps and its effectiveness is tracked periodically to ensure consistency.
- Ensures effective implementation of management systems like ISO 13485, ISO 9001, ISO 14001, ISO 45001 for the factory & ISO/IEC 17025 for lab are in place and effective for continuous improvement.
- Handled various Lean Six sigma projects to improve Productivity, Efficiency & reducing process wastes.
- Ensures that the manufactured product is fit for purpose and meets both external and internal specifications to ensure customer satisfaction.
- Ensure effectiveness of incoming, inline, and final inspection activity for quality product delivery.
- Ensuring test results reliability by training & on time calibration of equipment.
- Investigate customer complaints to coordinate with relevant departments to analyze root cause & implementation of corrective actions to avoid recurrence.
- Associated with procurement team on new vendor development, evaluation & validation by vendor audits to ensure consistency in quality material supplies.
- Participated in 5S, QCC, Kaizen projects for continuous improvement and encourage team to contribute ideas for system enhancement.

- Ensures quality control is fully staffed and capable of delivering intended quality products.

Work Experience - II

- Worked as ASSISTANT QUALITY MANAGER- SOFTLINES in SGS India Pvt Ltd,Bangalore from 28th April 2011 to O4th July 2022.

Job profile: Maintaining the Quality in each testing department to produce error-free test reports to improve Customer satisfaction by providing quality service & delivery on time.

Key Responsibilities

- Maintaining all type of documents in each level as per NABL 17025 & SGS Internal quality system
- Implementation of quality management systems to get improved customer satisfaction through performance,TAT & Query.
- Analyzing Root cause, maintaining correction & corrective actions to ensure mitigation of recurrence of non-conformity, complaints.
- To ensure the quality of testing by Internal correlation (ILC, IQC) & External Correlations (with various international bodies like AATCC, TEPS, ASTMD, etc.)
- Monitoring the samples & testing at each stage to ensure the results accuracy, repeatability, and its standards as per norms.
- Responsible as Branch Operations Integrity Coordinator to ensure integrity is being followed at all the time of all LOB-Line of Business.
- Providing suggestions to the customer for their query about improving product quality to meet buyer expectations in their products to import and export.
- Internal test Audit & Periodic random report verification to ensure the correct performance standards, requirements, and information as per Test request form.
- New developments coordinating with KAM team at the time of new enquiry from different buyers.
- To ensure appropriate protocol has been followed while Compilation of reports.
- Buyers Handled: Debenhams, Tesco, John Lewis, Sainsbury, VF, Tommy Hilfiger Cortefiel, Matalan, MacKay's stores, New Look, Dunnes Stores, Fat Face, French Connection, Peacock stores, River Island, etc.
- Audit Handled: NABL (17025), M&S, GCSC, C&A, OHSAS & Various Internal Audits asper ISO 17025, ISO 9001, and ISO 45001.

Work Experience - III

- Worked as MERCHANDISER in First Steps Baby Wear, Bangalore from 16th June 2007 to 02nd April 2011.

Job profile: Coordinating with buyers and internal departments to deliver products on time.

Key Responsibilities

- Coordination of new developments with development team at the time of new enquiry.
- Order confirmation- Order sheet receipt, verification, Making BOM & confirmation.
- Coordinating with planning department for capacity blocking and greige booking.
- Pre-production approvals (proto sample, size set sample, lab dips, print, embroidery strike off, Bulk fabric approval, etc.)
- Arrangements of Fit sample/Red seal/ Gold seal samples & follow up with cross functional team to deliver on time.
- Buyer communication. Coordinating with planning department for line planning, assortments, and delivery schedules with logistic arrangements.

- Buyers Handled: H&M, Baby Shop, M&S, George and Benetton.

Work Experience - IV

Worked as QUALITY ASSURANCE EXECUTIVE in S.P. Apparel, Avinashi, from 10th April 2006 to 13th June 2007.

Job profile: To ensure Quality Parameters set by Buyers on different products as per AQL.

Key Responsibilities

- Fabric, cutting panel, Initial, Mid, Inline & Final inspection according to AQL.
- Packing material & Quantity checking according to assortments as per packing lists.
- Final inspection for Quality, Quantity, destination, packing and price tags.
- Buyers handled: H&M, Tesco, Marks & Spencer, Benetton, Crocodile, etc..

Certifications

- NABL Technical Assessor as per ISO/IEC 17025:2017
- Certified Internal Auditor as per ISO 9001:2015
- Certified Internal Auditor as per ISO 13485: 2016
- Certified Internal Auditor as per ISO 14001:2015
- Certified Internal Auditor as per ISO 45001:2018
- Lean Six sigma Black belt holder
- Certified Internal Auditor of 5S
- Pursuing Environmental Social Governance course in NSE academy

Thesis Work

- Improvement of Fabric Realization – B. Tech
- Dyeing and Finishing Techniques - Diploma

Training Undergone

- Reid & Taylor, Mysore & BP Tex, Salem

Technical Skills

- Weaving, Processing, Designing, Spinning, Technical textiles, Testing and Quality Control

Computer Skills

- Course on computer aided textile designing (TEXTRONICS, NOVASCAN)
- Knowledge in basic computer operations (MS Word, MS Excel, MS Power Point) and Language C and BASIC

Personal Details

Name : R. Madhan
Father's Name: T.V. Rathinavel
Date of Birth : July 21st, 1984
Sex : Male

Marital Status : Married
Languages Known : English, Tamil, Kannada & Hindi.

Reference

Mr. Ramprasath, B. Tech, Dy. Director, NABL-Quality Council of India.
Mr. PM. Reddy, M. Tech- Regional Laboratory Manager, SGS India Pvt. Ltd.

Declaration

I hereby declare that all the information and details mentioned above are true and correct to the best of my knowledge and belief.

Yours sincerely
Date:
Place: Bangalore
R. Madhan

Annex 9
(*Item* 3.2)

COMMENTS ON 'IS 4360 : 2020, IS 4459 : 2020 AND IS 7845 : 2020, IS 17430 : 2020, IS 17431 : 2020, IS 17432 : 2020 AND IS 17433 : 2020'

Comment on 'IS 4360 : 2020 Method for determination of strength of fast bases'

Commentator: SHRI ARINDAM CHAKRABORTY, ATUL LTD, GUJARAT.

Comment

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Speciality Chemicals and Dyestuffs Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1967 and the present revision has been taken up to update the general information about analysis of fast bases given in Annex A.

Fast bases of different strengths are available in the market, therefore, determination of their strength is of importance to the consumer. The method outlined in this standard is useful for production control, production and import-export statistics where one normally deals with unblended fast bases.

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done accordance with IS 2 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

TEXTILE DYESTUFFS — METHOD FOR DETERMINATION OF STRENGTH OF FAST BASES

(First Revision)

1 SCOPE

1.1 This standard prescribes a method for determination of strength of fast bases as listed in Annex A.

1.2 The method prescribed in this standard is not applicable to mixtures of fast bases.

2 REFERENCES

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
IS 1070 : 1992	Reagent grade water

3 PRINCIPLE

The fast bases (aromatic primary amines) are quantitatively diazotized with nitrous acid. Knowing the quantity and strength of the sodium nitrite used in the reaction, the strength of fast bases is determined.

4 SAMPLING

4.1 Lot

All the containers of the same fast base and of the same concentration delivered to one buyer against one despatch note shall constitute a lot.

4.2 Unless otherwise agreed to between the buyer and the seller, the number of containers to be selected at random from a lot shall be as given in Table 1.

4.3 From each container, draw small quantities of the fast base by a suitable sampling instrument from at least three different parts and mix them thoroughly to get a composite test sample weighing about 50 g.

Table 1 Sample Size

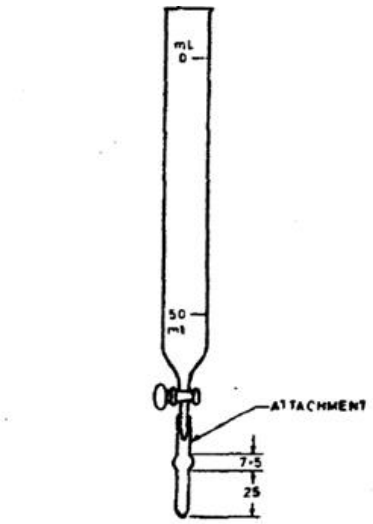
(*Clause* 4.2)

Sl No.	Lot Size	Sample Size
(1)	(2)	(3)
i)	Up to 100	3
ii)	101-300	4
iii)	301-500	5
iv)	501 and above	7

5 APPARATUS

5.1 Mechanical Stirrer

5.2 Burette, with a small attachment as shown in Fig. 1.



All dimensions in millimetres.
Fig. 1 Burette with an Attachment

5.3 Beakers, of 1 litre capacity.

5.4 Water-Bath

6 REAGENTS

6.1 Quality of Reagents

Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water or distilled water as reagent is intended.

NOTE — Pure chemicals shall mean chunk and that do not contain impurities which affect the test results.

6.2 Sodium Nitrite Solution, 0.5 N

6.3 Hydrochloric Acid, concentrated

6.4 Potassium Bromide Solution, 25 percent (w/v)

6.5 Standard Sulphanilic Acid Solution, 0.5 N

7 PROCEDURE

7.1 Take about 5 g of fast base from the composite test sample and weigh it accurately. Transfer it to 1 litre beaker. Add 50 ml of hydrochloric acid and 500 ml of distilled water. Dissolve the base completely by heating, if necessary (*see* Note 1). Cool it to room temperature and add 20 ml of potassium bromide solution (*see* Note 2). Keep the beaker in the water- bath containing chopped ice and water. Bring down the temperature of the contents in the beaker to about 5°C (*see* Notes 3 and 4).

NOTES:

1 For C.I. azoic diazo component 4 and C.I. azoic diazo component 8, the base is first dissolved in 100 ml of glacial acetic acid by warming, if necessary. After cooling the solution to 20°C, a mixture of 500 ml of water and 30 ml of concentrated hydrochloric acid is added. The solution is titrated immediately against sodium nitrite. Any precipitate formed initially will dissolve on addition of nitrite solution.
2 Potassium bromide is added as catalyst.
3 The temperature is brought to 5°C to avoid the loss of nitrous acid.
4 C.I. azoic diazo component 1 and C.I. azoic diazo component
5 may precipitate on cooling the solution to about 5°C. The diazotization should be carried out immediately as with time lapse, crystals may aggregate and lower the diazotization rate considerably.

Colour Index (1956). Ed 2. Society of Dyers and Coiourists, UK; and American Association of Tat & Chemists and Colorists, USA.

7.2 Immerse the tip of the burette well under the surface of the solution. Keep the solution under agitation with mechanical stirrer. Add the nitrite solution from the burette in small portions, and test the reaction mixture by putting a drop on starch iodide paper. Note the reading when the reaction mixture gives instantaneous blue colour with starch iodide paper (*see* Note 1).

NOTES:

1 The rate of addition of nitrite solution depends on how rapidly the base consumes the nitrous acid. There should be no large excess of nitrite present at any time, since this may cause loss of nitrous acid. At first the nitrite should be added in small portions and the solution tested by putting a drop on starch iodide paper. If the base consumes the nitrous acid rapidly, nitrite should be added more rapidly and vice versa. As the end-point is approached, nitrite will be consumed more slowly. The

end-point is recorded when an immediate blue colour appears on starch iodide paper which can be obtained repeatedly during a period of 5 minutes without the further addition of sodium nitrite.

2 For the fast bases C.I. azoic diazo component 4 the reaction mixture is strongly coloured. To observe the end-point it is necessary to rinse the starch iodide paper with distilled water immediately after spotting. paper indicates excess of sodium nitrite. A blue ring on the starch iodide paper indicates excess of sodium nitrite.

7.3 Determine the normality of the sodium nitrite solution by titrating against standard sulphanilic acid solution (*see* **6.5**).

7.4 Calculate the strength of the fast base by the following formula:

$$P = \frac{A \times N \times M}{10 \times W \times B}$$

Where,

P = Strength in percent, by weight, of the fast base;
A = Volume in ml, of sodium nitrite solution;
N = Normality of sodium nitrite solution (*see* **7.3**);
M = Molecular weight of the fast base;
W = weight, in g, of the fast base (*see* **7.1**); and
B = Number of amino groups per molecule.

7.5 Repeat the test prescribed in 7.1 and 7.2 twice and calculate the strength of fast base by the formula given in **7.4**.

7.6 Calculate the average of the values obtained as in **7.4** and **7.5**.

8 REPORT

Report the value obtained as in 7.6 as the strength of the fast base.

ANNEX A

(*Clause* 1.1)

GENERAL INFORMATION ABOUT ANALYSIS OF FAST BASES

Sl No.	Colour Index Designation	Commercial or Trade Name	Colour Index No.	Molecular Weight	No. of Amino Groups per Molecule
(1)	(2)	(3)	(4)	(5)	(6)
i)	Azoic diazo component 1	Fast Bordeaux GP Base	C.I. 37135	168	1
ii)	Azoic diazo component 2	Fast Orange GC Base	C.I. 37005	164 (hydrochloride)	1
iii)	Azoic diazo component 3	Fast Scarlet GG Base Fast Scarlet GGS Base	C.I. 37010	162 422 (Sulphate)	1 2
iv)	Azoic diazo component 4	Fast Garnet GB Base Fast Garnet GBC Base	C.I. 37210	225 261.5 (hydrochloride)	1 1
v)	Azoic diazo component 5	Fast Red B Base	C.I. 37125	168	1
vi)	Azoic diazo component 8	Fast Red GL Base	C.I. 37110	152	1
vii)	Azoic diazo component 10	Fast Red R Base Fast Red RC Base	C.I. 37120	157.5 194.0 (hydrochloride)	1 1
viii)	Azoic diazo component 11	Fast Red TR Base	C.I. 37085	178 (hydrochloride)	1
ix)	Azoic diazo component 12	Fast Scarlet G Base	C.I. 37130	152	1
x)	Azoic diazo component 13	Fast Scarlet R Base Fast Scarlet RC Base	C.I. 37105	168 204.5 (hydrochloride)	1 1
xi)	Azoic diazo component 32	Fast Red KB Base	C.I. 37090	178 (hydrochloride)	1
xii)	Azoic diazo component 44	Fast Yellow GC Base	C.I. 37000	164 (hydrochloride)	1

Colour Index (1956), Ed 2. Society of Dyers and Colourists, UK; and American Association of Textile Chemists and Colorists USA.

The molecular weight of the bases varies depending upon the whether the base is 1 free base, hydrochloride or a sulphate. The common commercial names of the bases are also given as industry is familiar with it.

Comment on 'IS 4459: 2020 - Method for determination of strength of direct dyestuffs by dyeing test'

Commentator: SHRI ARINDAM CHAKRABORTY, ATUL LTD, GUJARAT.

Comment

FOREWORD

This Indian Standard (*First Revision*) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Speciality Chemicals and Dyestuffs Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1967 and the present revision has been taken up to update in line with the developments in the dyeing industry. Direct dyes are marketed in large varieties, different strengths and also as mixtures. The method laid down in this standard for determining the strength of dyestuffs against a mutually accepted standard would be useful for assessing both the strength and the shade of the dyestuff.

The method prescribed in the standard is a general method and wherever special instructions are given by the manufacturers, these should be followed while carrying out the dyeings of the dyestuffs. In order to compare the exhaust property of the dyestuff under test and the standard dyestuff, it is recommended to carry out the exhaust dyeings. Normally the yellow dyeings are difficult to compare visually, it is, therefore, advisable to add a constant amount of similar type of blue dyestuff and get the dyeings in green colour. The green dyeings would facilitate the visual comparison in determining the strength of the dyestuff.

This standard contains 3.2 and 4.1 which call for agreement between the buyer and the seller and which permit the buyer to use his option for selection to his requirements.

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 'Rules for rounding off numerical values (*revised*)'.

TEXTILE DYESTUFFS — METHOD FOR DETERMINATION OF STRENGTH OF DIRECT DYESTUFFS BY DYEING TEST

(*First Revision*)

1 SCOPE

This standard prescribes a method for determination of strength of water-soluble direct dyes by normal dyeing test.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subjected to revision, and parties to agreements based on this standard are encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 SAMPLING

3.1 Lot

All the containers of the same dye and of the same concentration delivered to a buyer against a dispatch note shall constitute a lot.

3.2 Unless otherwise agreed to between the buyer and the seller, the number of containers to be selected at random from a lot shall be as given in Table 1.

Table 1 Sample Size
(*Clause* 3.2)

Sl No.	Lot Size	Sample Size
i)	Up to 100	3
ii)	101 to 300	4
iii)	301 to 500	5
iv)	501 and above	7

3.3 From each container draw small quantities of dye by a suitable sampling instrument from at least 3 different parts and mix them thoroughly to get a composite sample weighing about 20 g. This shall constitute the test sample.

4 STANDARD DYESTUFF

The standard sample of dyestuff against which the strength of dyestuff under test is evaluated shall be as agreed to between the buyer and the seller.

5 QUALITY OF REAGENTS

Unless specified otherwise pure chemicals shall be employed in tests and distilled water shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' mean chemicals that do not contain impurities which affect the experimental results.

6 EVALUATION OF STRENGTH OF DYESTUFF

6.1 Before dyeing the hanks, carry out a preliminary test to determine the approximate strength of the dyestuff under test by the method given in **6.1.1**.

6.1.1 Take separately 10 ml of 0.1 percent solution of the dyestuff under test and the standard dyestuff (*see* **B-4.1**). Put a spot each of the solutions of the dyestuff under test and the standard dyestuff on the filter paper. Visually examine the spots. If they are not equal, dilute the stronger solution with water to such an extent as to get approximately equal depth of spot on filter paper. Calculate the approximate strength of the dyestuff under test by the following formula:

Approximate strength of dyestuff under test, percent =

$$\frac{Vt \times 100}{Vs}$$

where,

Vt = Final volume in millilitres, of solution of the dyestuff under test; and
Vs = Final volume, in millilitres, of solution of the standard dyestuff.

6.2 Prepare 100 percent and 95 percent of 1 percent depth of the dyestuff under test by following the procedure given in Annex B.

NOTE — Depending on the strength of dyestuff under test, the hanks may be dyed in other suitable depths. One of the two dyeings may be 0.5, 1.5 or 2 percent depth (instead of 1 percent) so as to give medium shade which is convenient for visual comparison. The other dyeing would be of 95 percent strength of the first dyeing.

6.3 Similarly, prepare dyeings of different percentages (*see* Note 1 and 2) of standard dyestuff by following the procedure given in Annex B.

NOTES:

1 The percentages of strength of dyeings of standard dyestuffs should be so arranged that the difference between the two consecutive dyeings is approximately 5 percent and the dyeings are well-distributed on either side of the approximate percentage strength determined by the spot, test.
Example: If the strength of the dyestuff as determined by the spot test is 60 percent, then the different dyeings of the standard dyestuff should be of 60 percent, 60 ± 5 percent (57 and 63 percent) and 60 ± 10 percent (54 and 66 percent).

2 The dyeings obtained with the dyestuff under test should fall within the range of dyeings obtained with the standard dyestuff.

6.4 Carry out the dyeings of the fresh hanks in the exhaust liquor of the above dyeings by following the procedure given in **B-4.3**.

6.5 Compare the dyeings obtained as in **6.2** and the dyeings obtained as in **6.3** (*see* Note). Select a dyeing of the standard dyestuff which exactly matches with one of the dyeings of the dyestuff under test. Note the percentages of the dyeings which match exactly.

NOTE — Before comparing the dyeings, they should be spread out properly. The dried hanks should be laid side by side in the same plane and oriented in the same direction. They should be combed to a thickness to avoid the effect of other backing on the appearance. The hanks should be visually compared under D65 light source. The consistency in strength variation of different dyeings of standard dyestuff and the dyestuff under test should be observed. If the strength variations between the two consecutive dyeings are not constant, the dyeings should be repeated.

6.6 Calculate the strength of the dyestuff under test by the following :

$$S = \frac{A \times 100}{B}$$

Where,

S = Strength of dyestuff, in percent;
A = Percentage dyeing of the standard dyestuff; and
B = Percentage dyeing of the dyestuff under test matching with A.

7 REPORT

7.1 Report the value obtained as in 6.6 as the strength in percent of the dyestuff under test.

7.1.1 Report the shade of the dyestuff under test in comparison with the shade of the standard dyestuff.

7.2 Report also the shade of the exhaust dyeings of the sample in comparison with the shade of the exhaust dyeings of the standard dyestuff.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*TITLE*
IS 1070 : 2023	Reagent Grade Water Specification (*Fourth Revision*)

ANNEX B

(*Clauses* 6.2 and 6.3)

GENERAL METHOD FOR DYEING OF DIRECT COLOURS

B-1 APPARATUS

B-1.1 Dye Vessels, porcelain or stainless steel beakers or dye-vessels provided for mechanically agitated dyebaths.

B-1.2 Watch-glass

B -1.3 Graduated Pipettes, capable of measuring correct to 0.1 ml.

B -2 DYEING ASSISTANTS

B -2.1 Water, Distilled Water (*see* IS 1070), shall be used in the preparation of the dye-bath.

NOTE — For rinsing water having hardness of not more than 50 ppm expressed as calcium carbonate may be used.

B -2.2 Soda Ash Solution, 10 percent (w/v).

B -2.3 Sodium Chloride Solution, 10 percent (w/v).

NOTE — 10 percent solution (w/v) of sodium sulphate may be used.

B -3 PREPARATION OF HANKS FOR DYEING

B -3.1 A sufficient number of hanks of scoured, bleached, unmercerized cotton yarn having no finishing chemical or blueing agent shall be used in this test. Each hank should weigh 10 ± 0.1 g (*see* Note 2).

NOTES:

1 Any yarn normally used in the laboratories for carrying out trials or yarn of the following requirements, is suitable for this test:

a) Count – 10 tex x 2 (or 60s/2),
b) Twist per metre - 750, and
c) Cuprammonium fluidity not more than 5 rhes.

2 If the weight of the hank is not 10 ± 0.1 g, then it should be weighed accurately and the amount of dyestuff and the chemicals to be taken should be calculated accordingly**.**

B-3.2 Preparation of Test Hanks

The hanks shall be treated in boiling water for 10 min, squeezed evenly to contain approximately its own weight of water, cooled and entered into the dye-bath.

B -4 PROCEDURE

B -4.1 Preparation of Dyestuff Solutions

B-4.1.1 Weigh accurately 1.0 g of dyestuff under test. Paste it thoroughly with cold water. Add hot water and dissolve the dyestuff. If necessary, heat the solution till it becomes clear. Dilute the solution to 1 litre with cold water.

B-4.1.2 Similarly, prepare solution of the standard dyestuff by following the procedure given in **B-4.1.1,** but taking the standard dyestuff instead of the dyestuff under test.

B-4.2 Dyeing (for 10 ± 0.1 g Hank)

B-4.2.1 Pipette out separately the required amount of solution of dyestuff under test (*see* Note 1) in the dye-vessels so as to give 100 percent and 95 percent dyeings of the 1 percent depth (*see* **6.2** and Note under it). Add requisite quantity of water to make the volume of dye liquor 300 ml (*see* Note 2). Add 5 to 10 ml of sodium chloride solution depending on the nature of the dyestuffs (*see* Note 3). Stir the dye liquors and enter the wetted hanks at 40°C. Turn the hanks frequently so as to obtain level dyeings. Slowly raise the temperature of water-bath to 80˚ C within 20 min. Remove the hanks from the dyebath, add second lot of 5 to 10 ml of sodium chloride solution and stir. Enter the hanks into the dye-bath and raise the temperature of the water-bath to boil and continue to dye at boil (of water-bath) for 40 min (*see* Notes 4 and 5). At the end of the dyeing squeeze the dyed hanks returning the squeezed out solutions back to respective dyebaths and rinse them well in cold water. Dry the hanks in oven at temperature not exceeding 70°C.

NOTES

1 The amount of dye solution to be taken for dyeing to give required percentage may be calculated as follows:
Volume, in ml, of 0.1 percent solution of dyestuff = $p \times y$

Where,
p = Percentage depth of dyeing (for example, 0.5, 1 or 2 percent); and
y = Percentage dyeing (for example, 95 or 100 percent).

General formula for the calculation is as follows:
Volume, in ml, of stock solution of dyestuff required for dyeing = $\frac{w \times p}{v} \times \frac{y}{100}$

Where,
w = Weight in g, of the hank;
p = Percentage depth (for example, 0.5 or 1 percent);
v = Strength in percent, of the dyestuff solution (0.10 percent in this case); and
y = Percentage dyeing (for example, 95, 100 or 105 percent).

2 The liquor to material ratio should be 30 : 1.
3 One percent soda ash on the weight of the hanks should also be added, if dyestuff is sensitive to acid.
4 During dyeing, water should be added to make-up the volume lost by evaporation**.**
5 The total time taken for dyeing should be 70 min and the temperature should be raised to boil during first 30 min.
6 The dyeing process including amount of salt/liquor to material ratio may vary depending on the specific dyestuff and dyestuff manufacturer's recommendations. So, recommendations of dyestuff manufacturer should be considered.

B-4.2.2 Similarly, pipette out separately different amounts of solution of the standard dyestuff in different dye-vessels (*see* Note). Dye the hanks by following the method given in **B-4.2.1.**

NOTE — The dyeings with the solutions of the dyestuff under test and of the standard dyestuff should be done simultaneously in the same water-bath.

B-4.3 Exhaust Dyeing

Make up the volumes of the exhaust liquors (*see* **B-4.2.1** and **B-4.2.2**) to the original volume (300 ml). Enter fresh wetted hanks in the exhausted dye-baths and continue dyeing for 30 min at boil. Squeeze the hank, rinse well in cold water and dry.

1. **Comment on 'IS 7845: 2020 - Textile Dyestuffs - Method for Evaluating Strength of Reactive Dyes (Trichloropyrimidyl Type) by Dyeing Test (First Revision)'**

Commentator: SHRI ARINDAM CHAKRABORTY, ATUL LTD, GUJARAT.

Comment

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Speciality Chemicals and Dyestuffs Sectional Committee had been approved by the Textiles Division Council.

Reactive dyes are marketed in different strengths. The method laid down in standard for determining the strength of trichloropyrimidyl type (reactone/drimarene) dyestuffs against a mutually accepted standard would be useful for assessing the comparative strength of dyestuffs only. This method may not necessarily be the most economical method of dyeing.

This standard was first published in 1975. The first revision has been made in the light of experience gained since its publication and to incorporate the following major changes:

a) Title of the standard has been modified;
b) Scope of the standard has been modified;
c) Grade and purity of chemicals used have been specified;
d) Sampling clause has been modified; and
e) References to Indian Standard have been updated.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

Indian Standard

TEXTILE DYESTUFFS — METHOD FOR EVALUATING STRENGTH OF REACTIVE DYES (TRICHLOROPYRIMIDYL TYPE) BY DYEING TEST

(*First Revision*)

1 SCOPE

This standard prescribes a method for determination of strength of reactive dyes (trichloropyrimidyl type) by dyeing test. This standard does not include automated instrumental method.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	Title
255 : 1982	Specification for Sodium Sulphate, Anhydrous (Technical Grade) (*second revision*)
1070 : 1992	Reagent Grade Water – Specification (*third revision*)

3 SAMPLING

3.1 Lot — All the containers of the same dye and the same strength delivered to a buyer against a dispatch note shall constitute a lot.

3.2 Unless otherwise agreed to between the buyer and the seller the number of containers to be selected at random from a lot shall be in accordance with Table 1.

3.3 From each container draw small quantities of the dye by a suitable sampling instrument from at least three different parts and mix them thoroughly to get a composite sample weighing about 20 g. This shall constitute the test sample.

Table 1 Sample Size

(*Clause* 3.2)

Lot Size	Sample Size
(1)	(2)
2 to 15	2
16 to 25	3
26 to 50	4
51 to 100	5
101 to 150	6
151 to 300	7
301 and above	8

4 STANDARD DYESTUFF

The standard sample of dyestuff against which the strength of dyestuff under test is evaluated shall be as agreed to between the buyer and the seller.

5 QUALITY OF REAGENTS

Unless otherwise specified analytical reagent grade chemicals with 99.0 percent purity shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water as reagent is intended.

6 EVALUATION OF STRENGTH OF DYESTUFF

6.1 Prepare dyeings of the standard sample of dyestuff (see 4) by following the procedure given in Annex A; prepare simultaneously additional dyeings of the standard sample, with the percentage variations of dyeing strength by 5 percent on the lower side as well as on the upper side of the recommended percentage.

6.2 Simultaneously, prepare dyeings of different percentages of the dyestuff under test by following the procedure given in Annex A.

6.3 Compare the dyeings as obtained in 6.2 and the dyeings obtained as in 6.1 (see Note). Select a dyeing of the dyestuff under test which exactly matches with one of the dyeings of the standard dyestuff. Note the percentage of the dyeing which matches exactly.

NOTE — Before comparing the dyeings, they shall be spread out properly. The dried hanks shall be laid side by side in the same plane and oriented in the same direction. They should be combed to a uniform thickness to avoid the effects of backing on the appearance. The hanks shall be visually compared under D65 light source. The consistency in strength variation of different dyeings of standard dyestuff and the dyestuff under test shall be observed. If the strength variations between the two consecutive dyeings are not constant, the dyeings shall be repeated. If the dyeings of the test sample and the standard do not fall within range, fresh set of dyeings shall be taken.

7 CALCULATION

Calculate the strength of the dyestuff under test by the following formula:

$$S = \frac{A}{B} \times 100$$

Where,

S = strength of dyestuff in percent,

A = percentage dyeing of the standard dyestuff, and

B = percentage dyeing of the dyestuff under test which matches with A.

8 REPORT

Report the value obtained as in 7 as the strength in percent of the dyestuff under test.

ANNEX A

(*Clauses* 6.1 *and* 6.2)

METHOD FOR DYEING REACTIVE DYES (TRICHLOROPYRIMIDYL TYPE)

A-1 APPARATUS

A-1.1 Dye Vessels — porcelain or stainless steel vessels.

A-1.2 Graduated Pipettes — capable of measuring correct to 0.1 ml.

A-1.3 Volumetric Flask — calibrated to 500 ml.

A-2 DYEING ASSISTANTS

A- 2.1 Water — Distilled water (*see* IS 1070) shall be used in the preparation of the dye-bath.

NOTE — For rinsing, water hardness of not more than 50 ppm expressed as calcium carbonate may be used.

A-2.2 Sodium Sulphate (Calcined) Solution — 20 percent *(m/v)* (*see* IS 255).

NOTE — Quality of sodium sulphate solution is extremely important. Commercial brands may be acidic or alkaline, therefore they shall be neutralized.

A-2.3 Sodium Carbonate Solution — 10 percent (*m/v*).

A-2.4 Mild Oxidant Solution — such as meta-nitro benzene sulphonic acid sodium salt, 10 percent (*m/v*).

A-2.5 Soap Solution — containing 0.2 percent (*m/v*) of neutral detergent.

A-3 PREPARATION OF THE HANKS FOR DYEING

A-3.1 A sufficient number of hanks of scoured, bleached, unmercerised cotton yarn (*see* NOTE 1) having no finishing chemicals or blueing agent shall be used in this test. Each hank shall weigh 10 ± 0.1 g (*see* NOTE 2).

NOTES

1 Any yarn normally used in the laboratories for carrying out trials or yarn of the following requirements is suitable for this test:

a) Count — 10 tex × 2 (or 60s/2)

b) Twist per metre — 750, and

c) Cuprammonium fluidity not more than 5 rhes.

2 If the mass of the hank is not 10 + 0.1 g then it shall be weighed accurately and the amount of dyestuff and the chemicals to be taken shall be calculated accurately.

A-3.2 Preparation of the Test Hanks

Treat the hanks in boiling water for 10 minutes, squeeze evenly to contain approximately its own mass of water, cool and enter into the dye-bath.

A-4 PROCEDURE

A-4.1 Preparation of the Dyestuff Solutions

Weigh accurately 1.0 g of the dyestuff under test. Paste the dyestuff with cold water and dissolve by adding hot water (not higher than 50°C). The total volume of water used for dissolution of dyestuff shall not exceed 100 ml. Dilute the solution with cold water and make up 500 ml in a volumetric flask.

A-4.1.1 Similarly, prepare a solution of the standard dyestuff by following the procedure given in **A-4.1** but taking the standard dyestuff instead of the dyestuff under test.

A-4.2 Dyeing (for 10 ± 0.1 g Hank)

A-4.2.1 Pipette out separately the required amount of solution of standard dyestuff in the dye vessels so as to give 1.9, 2.0 and 2.1 percent depth. Add the requisite quantity of water and 30 ml sodium sulphate (calcined) solution, 3 ml of mild oxidant solution to make the volume of the dye liquor 300 ml (liquor to material ratio of 30 : 1) leaving sufficient margin for the addition of alkali and remaining salt solution . Set the dye-bath at 40°C, stir the dye liquor and enter the wetted hanks. Turn the hanks frequently so as to obtain level dyeings. Add 60 ml of sodium carbonate solution and raise temperature of the dye-bath from 40°C to 70°C in 15 minutes turning the hanks at regular intervals. Then add to the dye-bath 30 ml of sodium sulphate (calcined) solution and maintain the temperature at 95°C for 1 hour, turning the hanks frequently to obtain level dyeings.

A-4.2.2 Remove the dyeings and squeeze the dyed hanks evenly. Rinse the dyed hanks first in cold water and then in hot water. Treat the dyed hanks at boil for 15 minutes in a soap solution at liquor to material ratio of 30 : 1; rinse in cold water and again treat the hanks at boil for 15 minutes in soap solution at liquor to material ratio of 30 : 1. Finally rinse the dyeings in cold water and dry.

A-4.2.3 Similarly, pipette out separately required amounts of solution of the dyestuff under test in separate dye vessels (*see* NOTE). Dye the hanks by following the method given in **A-4.2.1**.

NOTE — The dyeings with the solutions of the dyestuff under test and of the standard dyestuff should be done simultaneously in the same water-bath.

Comments on 'IS 17431 : 2020, IS 17433 : 2020, IS 17430 : 2020 and IS 17432 : 2020'

Commentator: SHRI BOSCO HENRIQUES, BIO DYES, GOA.

Comment

Dear

Comments on IS 17431 IMPATEINS BALSAMINA; IS 17433 TERMINALIA ARJUNA; IS 17430 CANNA INDICA and IS 17432 TECTONA GRANDIS

1) Use full plant name only the first time, then use only the initials of the Genus name eg., *I. balsamina.*

2) Index ingredient is not defined, and reference standard of index ingredient is not used in chromatography procedure.

3) Length of TLC plate not indicated.

4) Are the colours in the drawings of the developed TLC plates of any indicative value. If not, that should be stated.

5) As PDA detector is not used in HPLC it should not be mentioned.

6) How does a testing lab obtain authentic standards.

7) How does one conclude if test sample is authentic. Use R_f values, ratios of peaks? These are not exactly reproducible.

Methanol extraction of dye from fabric may not work with fabrics dyed by different dyeing procedures.

Results of dye extracted from fabric not given. They need not be the same as that of the plant material extracts, since not all components of the extracts bind to the fabric and some that bind may not elute under the extraction conditions.

Specific comment for IS 17431 IMPATEINS BALSAMINA

1) Genus name is wrongly spelt. Correct botanical name is *Impatiens balsamina* L.

2) Hindi name is Gulmehendi,

3) Slope of graph in Fig. 4 and Fig. 5 between 400 and 425 is dissimilar. The x-axis and y-axis units in Fig. 5 are not labelled and the figures appear to be inverted images.

Specific comment for IS 17432 TECTONA GRANDIS

1) Only small young tender reddish leaves yield reddish dye. Green mature leaves yield yellow dye. Hence, range of the reddish leaf size collected has to be mentioned.
2) As the red colourant decreases as the leaves grow and turn green, the profiles shown in Figs. 2-4 will progressively change. Hence they cannot serve as a reference..

Regards
Bosco Henriques