ISSN(O): 2320-5407 | ISSN(P): 3107-4928

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

ISSN NO. 2320-5407

REVIEWER'S REPORT

Manuscript No.: IJAR-59002

Title: TECHNOLOGICAL SCHEME FOR PRODUCING OLIGOURETHANES AND EPOXYURETHANES,

Recommendation:
Accept after minor revision

Rating	Excel.	Good	Fair	Poor
Originality		✔		
Techn. Quality			✔	
Clarity			✔	
Significance	✔			

Reviewer's ID: Bilquees Hamza

Detailed Reviewer's Repor

The manuscript presents an investigation into non-isocyanate routes for synthesizing oligourethanes and epoxyurethane polymers, aiming to mitigate the toxicity and environmental hazards associated with traditional di- and polyisocyanate-based production. The study utilizes accessible hydroxyl-containing starting materials—specifically ethylene glycol, glycerol, and phthalic anhydride—alongside urea and formaldehyde to form urethane oligomers, which are subsequently combined with epoxy resin (KER 828) and cured. The authors detail process flowcharts, mechanical testing (tensile strength and modulus of elasticity), and qualitative assessments of performance parameters such as adhesion, chemical resistance, and water absorption.

The manuscript addresses a subject of significant relevance to green chemistry, industrial safety, and protective composite manufacturing. The non-isocyanate synthesis pathway offers clear environmental and health advantages. However, the manuscript requires substantial scientific refinement, clearer reporting of methodology, thorough statistical presentation of data, and corrections to text errors and structural formatting before it can be considered suitable for publication.

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DETAILED RECOMMENDATIONS FOR IMPROVEMENT

1. Scientific Rigor, Characterization, and Methodological Clarity

- The authors state that non-isocyanate urethane groups were synthesized via the reaction of polyols (ethylene glycol, glycerol, or phthalic anhydride) with carbamide components and formaldehyde. However, the exact reaction mechanisms, chemical equations, and structural characterizations of these oligomers are largely absent. The paper should include spectroscopic proof (such as FTIR or NMR) confirming the formation of carbamate/urethane linkages and the consumption/absence of residual free formaldehyde or amine intermediates.
- In Table 3, four specific formulation ratios are presented (EPU-15EG, EPU-30G, EPU-70F, and EPU-100F). The rationale behind selecting widely disparate mass ratios—ranging from 1.5:1 up to 10:1 oligourethane-to-epoxy resin—needs deeper theoretical justification. Furthermore, EPU-30G is listed with zero hardener (PEPA = 0), whereas the other samples utilize varying amounts. The author should clarify the curing mechanism occurring in EPU-30G in the absence of PEPA.
- Tensile properties reported in Table 5 only present data for neat ED-20 and KER 828 polymers. The tensile strength and modulus data for the newly developed epoxyurethane formulations (EPU-15EG, EPU-30G, EPU-70F, and EPU-100F) are missing from the primary comparative table, even though Figure 2 and Table 5 are meant to provide a baseline. The authors must supply quantitative tensile and impact data for all four synthesized epoxyurethane compositions to substantiate claims of "increased elasticity" and "reduced intrinsic brittleness".

2. Figure, Table, and Process Flowchart Presentation

- Figure 1 displays a detailed process flowchart including numbered equipment (reactors, jacketed tanks, condensers, absorbers). However, the text key provided in lines 145–152 contains incomplete entries (e.g., item numbers 20 and 21 are truncated as "adjusting/standardization; 21" without complete description). The key must be meticulously aligned with every numbered element in the diagram.
- Table 4 summarizes key properties (Degree of curing, Adhesion strength, Water absorption, Chemical resistance, Impact resistance, Thermal resistance) alongside testing standard numbers (ISO, GOST). However, values are given only in qualitative terms such as "high", "low", or "increased". To adhere to international scholarly standards, the authors must replace these qualitative descriptors with numerical test data (e.g., adhesion in MPa, water absorption percentage by weight, impact strength in kJ/m^2, thermal resistance via HDT/TGA temperatures).

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3. Textual Editing, Typographical Corrections, and Duplicate Content

- The text contains duplicate paragraphs and residual layout artifacts that must be excised:
  - Abstract lines 12–14 ("The resulting epoxyurethane materials were shown to possess high adhesion...") repeat verbatim in lines 21–23.
  - Line 86 contains unedited editorial artifact text: "Mana matningizningilmiy-akademikingliztilidagitarjimasi: R". This must be removed.
  - Lines 141–142 contain a redundant duplicate fragment of the flowchart image callout and layout numbers.
  - Line 190 contains duplicated phrasing: "Based on the results the results of this study...".
- Typographical and spelling errors throughout the manuscript must be corrected:
  - Table 1 row "Thermalstability": Correct " | evatedtemperat" to "Elevated temperatures" or "High temperatures".
  - Table 1 row "Lowwaterabsorption": Insert spaces ("Low water absorption").
  - Table 1 row "Thermalstability": Insert spaces ("Thermal stability").
  - Table 1 row "Wearresistance": Insert spaces ("Wear resistance").
  - Table 1 row "Resistancetodeformation": Insert spaces ("Resistance to deformation").
  - Table 2 headers: Insert missing spaces in "Main Operations", "Heatingandstirring", "Formationofurethanegroups", "Maintenanceoftargettemperature", "Reactioncompletion", "Producttemperaturereduction", and "Obtaining a stableoligomer".
  - Line 114: Insert missing word/colon "EPU-100F: the mass ratio...".
  - Table 3: Ensure Russian Cyrillic notation (ЭПУ-15ЭГ, ЭПУ-30Г, ЭПУ-70Ф, ЭПУ-100Ф) is standardized to English Latin transliteration (EPU-15EG, EPU-30G, EPU-70F, EPU-100F) as defined in lines 109–115.
  - Table 4 headers: Correct concatenated strings ("Test'Method", "Degreeofcuring", "Adhesionstrength", "Waterabsorption", "Chemicalresistance", "Impactresistance", "Thermalresistance").

4. Reference List Formatting and Bibliographic Standardisation

- Reference 4 (Yilgör et al., 2018) is incomplete and missing volume, issue, and page numbers.
- Reference 5 (Kochergin & Zolotareva, 2024) lacks publisher details or journal title.
- Reference 7, 8, 14, and 15 contain bracketed titles or Russian publication markers that need standard formatting according to IJAR author guidelines.
- Reference 13 lists repetitive year fields ("№ 2024").

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- Ensure all citations in the reference list follow a consistent citation format (such as APA or IEEE) with complete author lists, publication years, volume/issue numbers, and DOIs where available.

CONCLUSION AND FINAL RECOMMENDATION

This manuscript outlines a practical non-isocyanate process scheme with potential industrial utility in corrosion protection and composite manufacturing. However, the paper in its present form relies heavily on qualitative generalizations and lacks critical comparative quantitative data for the synthesized epoxyurethane formulations. Addressing the chemical characterization gaps, providing complete numerical mechanical data, fixing duplicated text sections, and resolving the widespread typographical and formatting issues will be necessary to bring the paper up to publication standards.

Recommendation: Revision