



HYDROGEN STORAGE POTENTIAL OF TiO₂/KAOLIN NANOCOMPOSITE FOR SUSTAINABLE ENERGY APPLICATIONS

Kabuche N. Kanizi ^{a, b, *}, Elianaso E. Kimambo ^b, Fortunatus R. Jacob ^a

^a*Department of Chemistry, College of Natural and Applied Science, University of Dar es salaam, Tanzania*

^b*Department of Chemistry, Mkwawa University College of Education, University of Dar es Salaam, Tanzania*

*Corresponding author, Email address: Kabuche.kanizi@muce.ac.tz

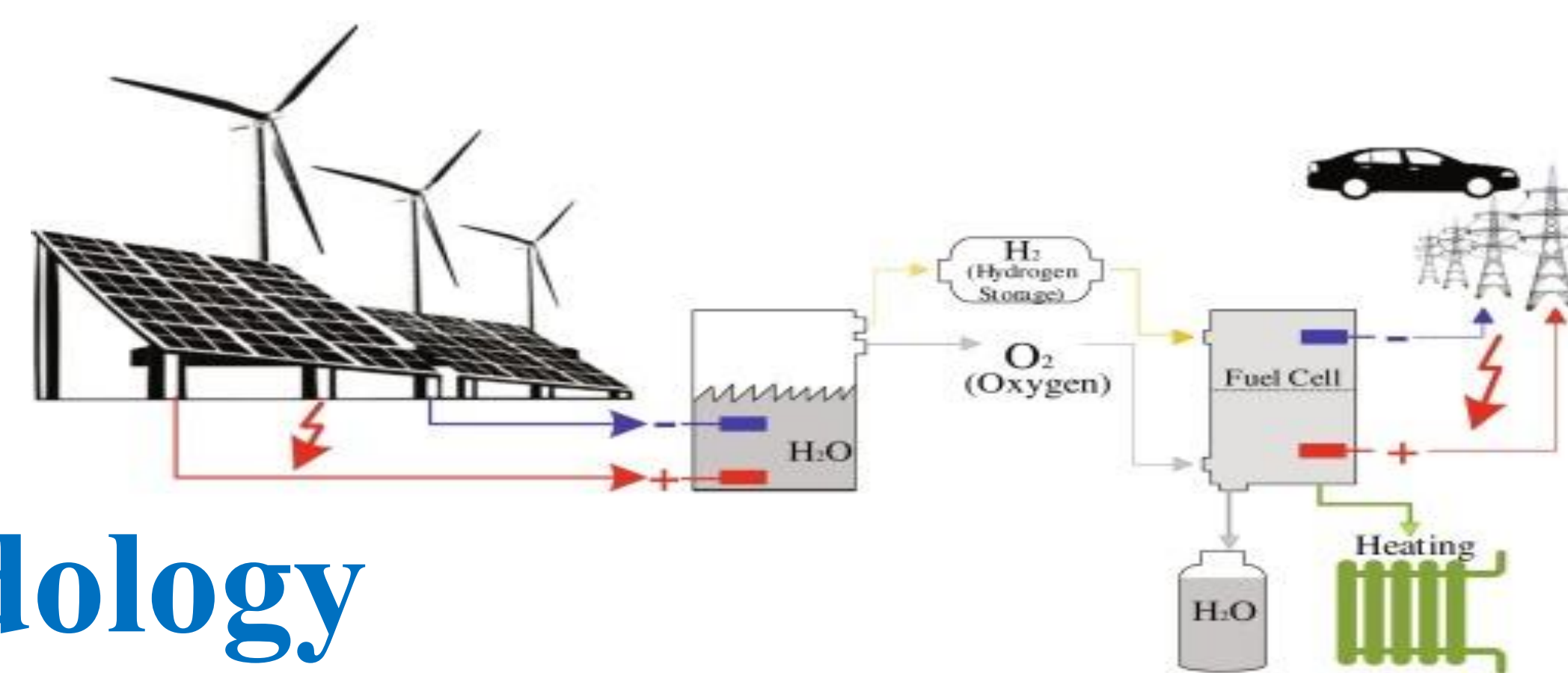


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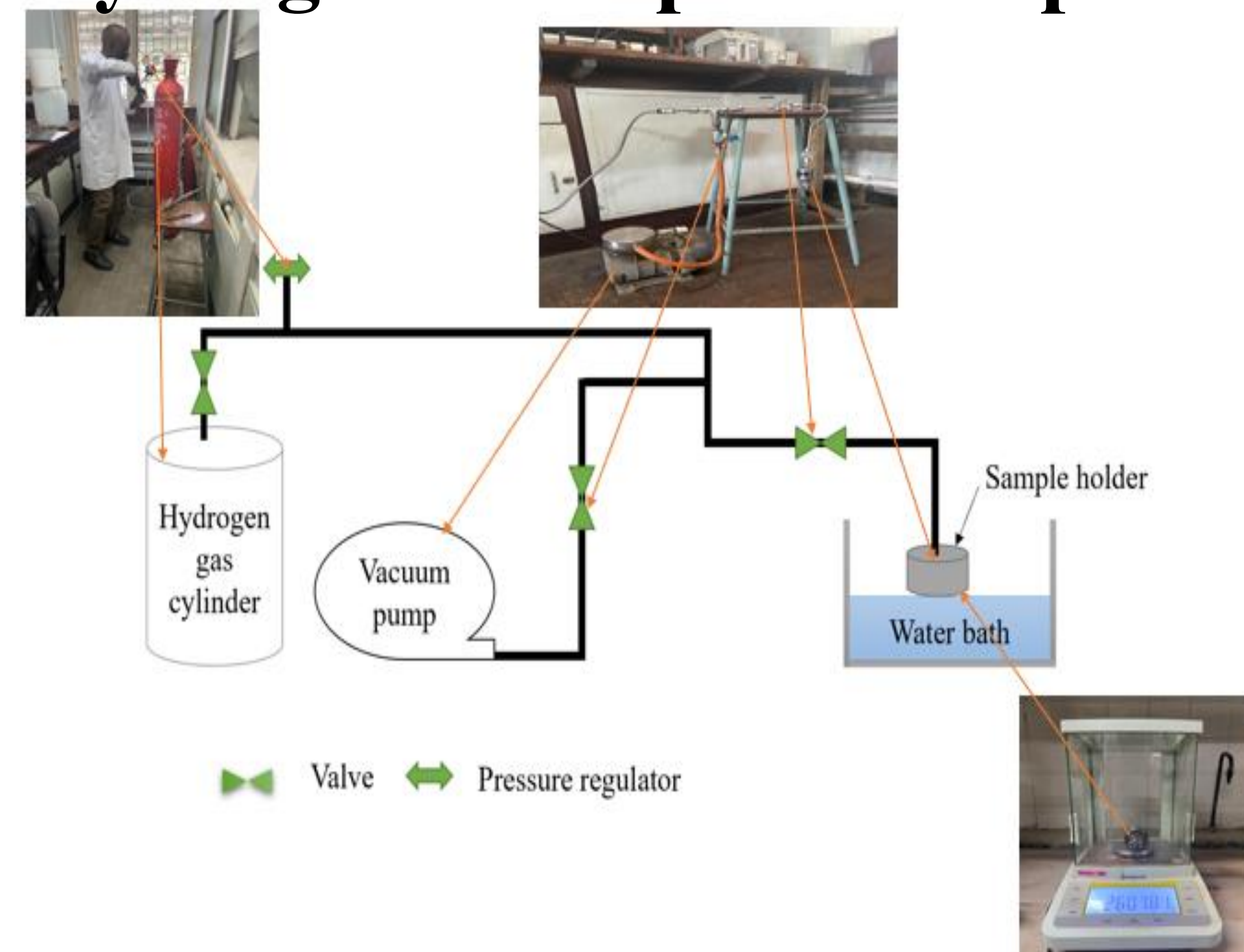
Introduction

- ❖ Hydrogen is increasingly recognized as a clean and versatile energy carrier capable of supporting the transition away from fossil fuels and reducing greenhouse gas emissions. Its high energy density and ability to be produced from diverse resources make it a promising solution for sustainable energy systems and global energy security [1,2].

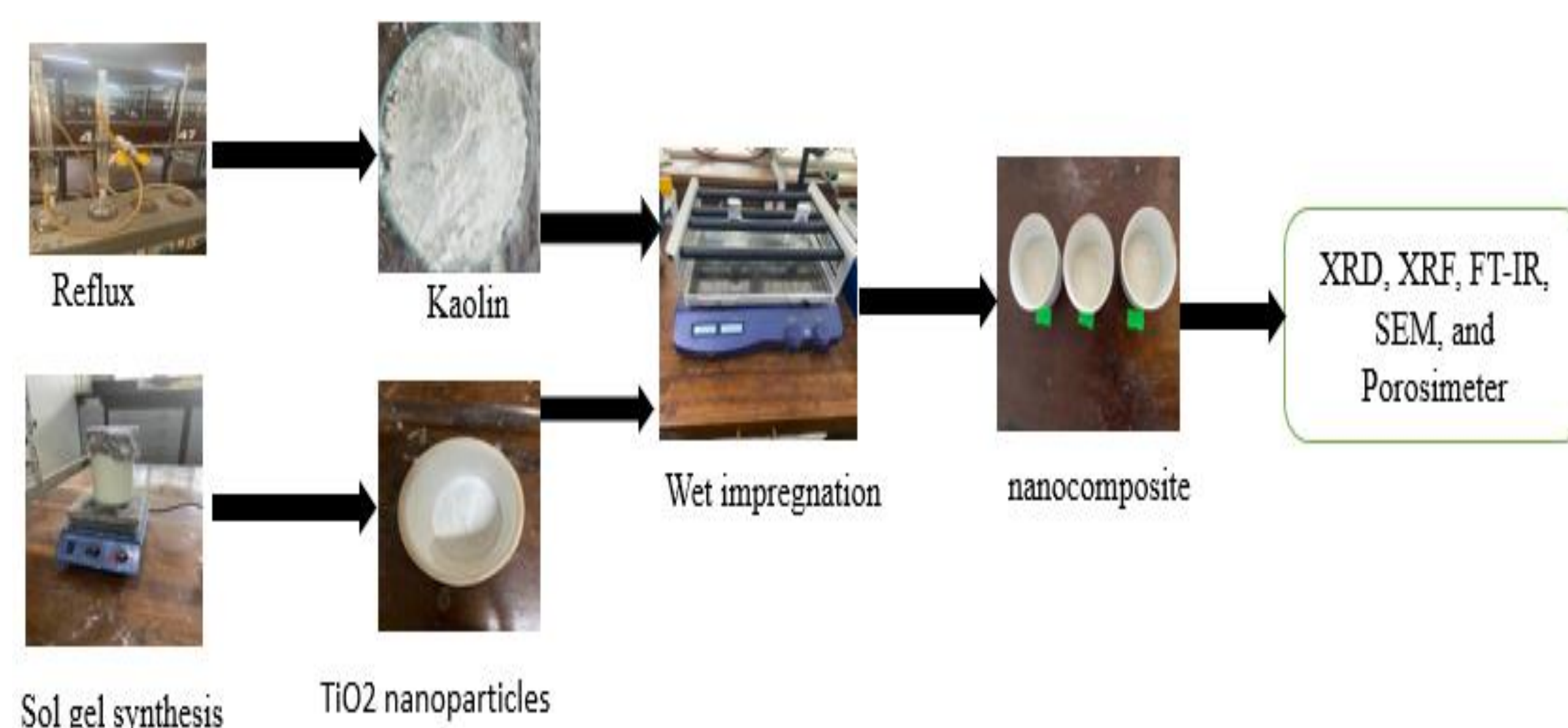
Methodology



Hydrogen adsorption setup

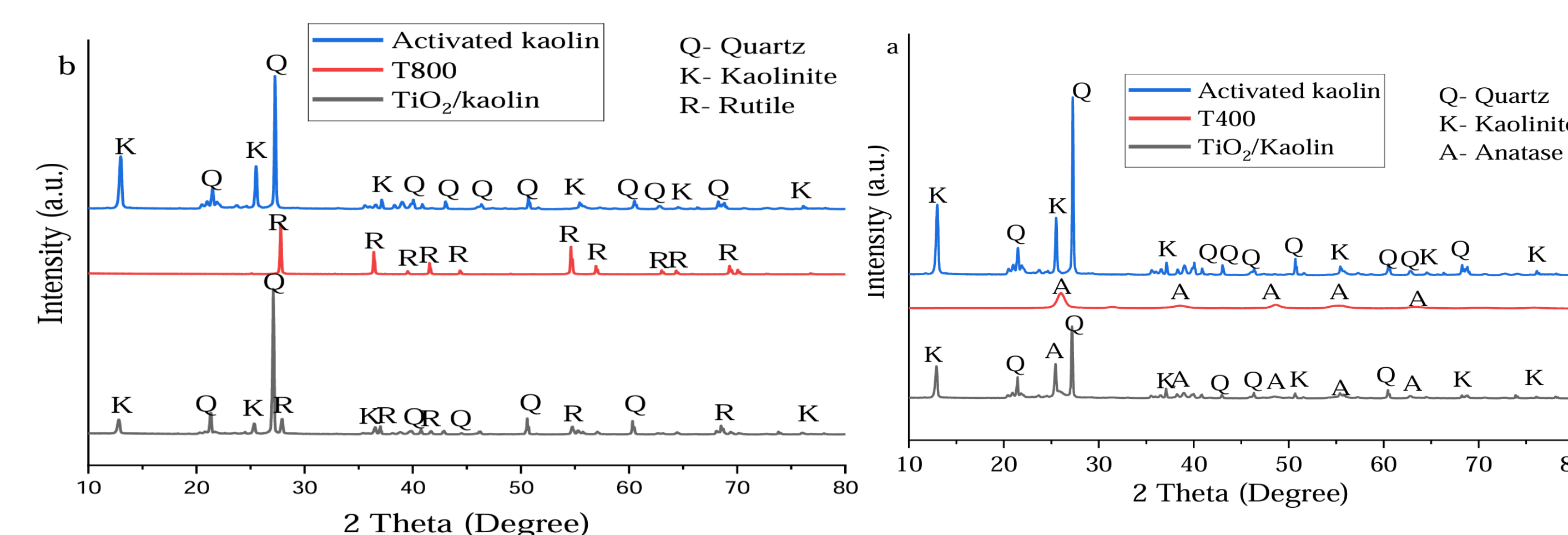


Preparation of adsorbents



Results

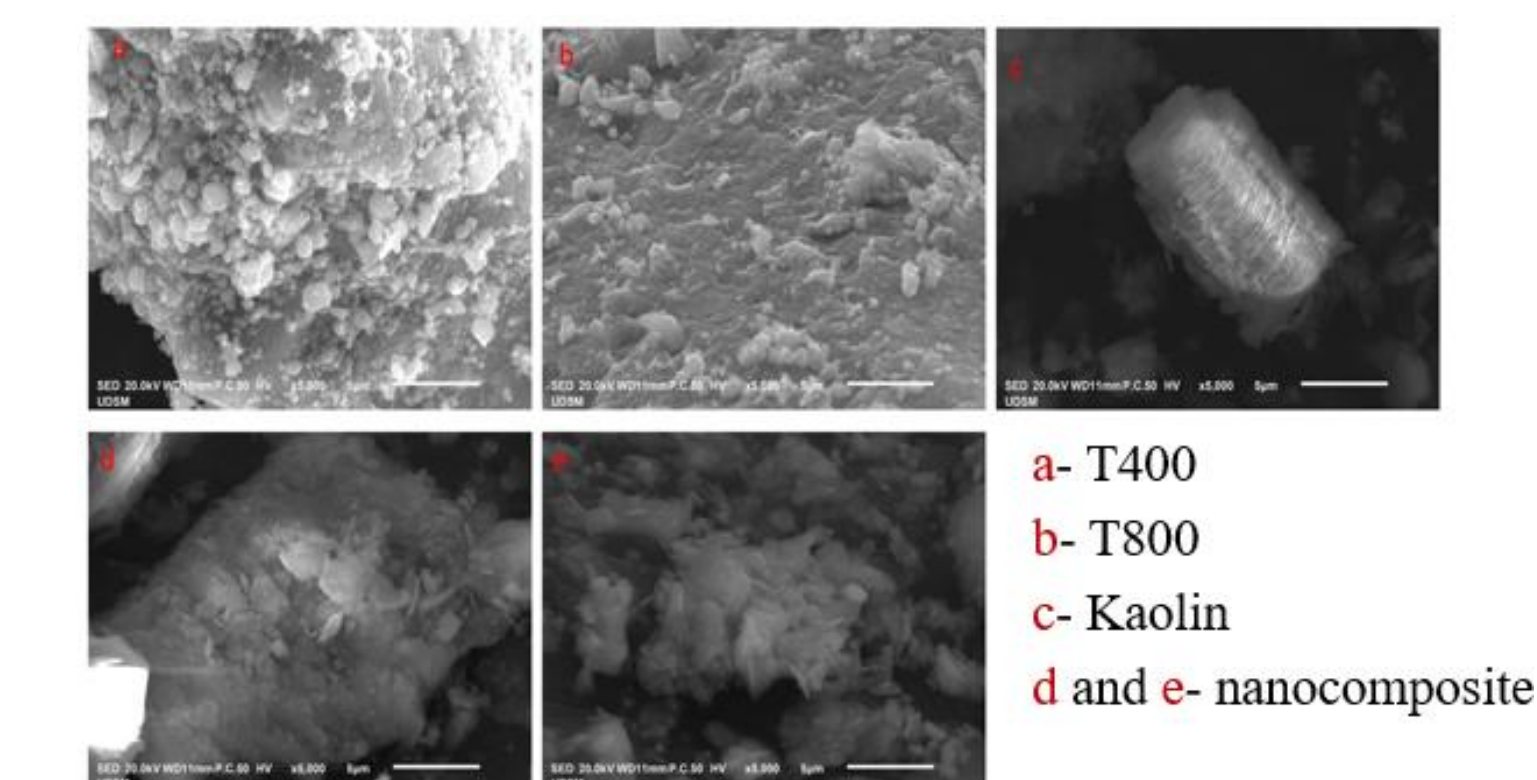
XRD results



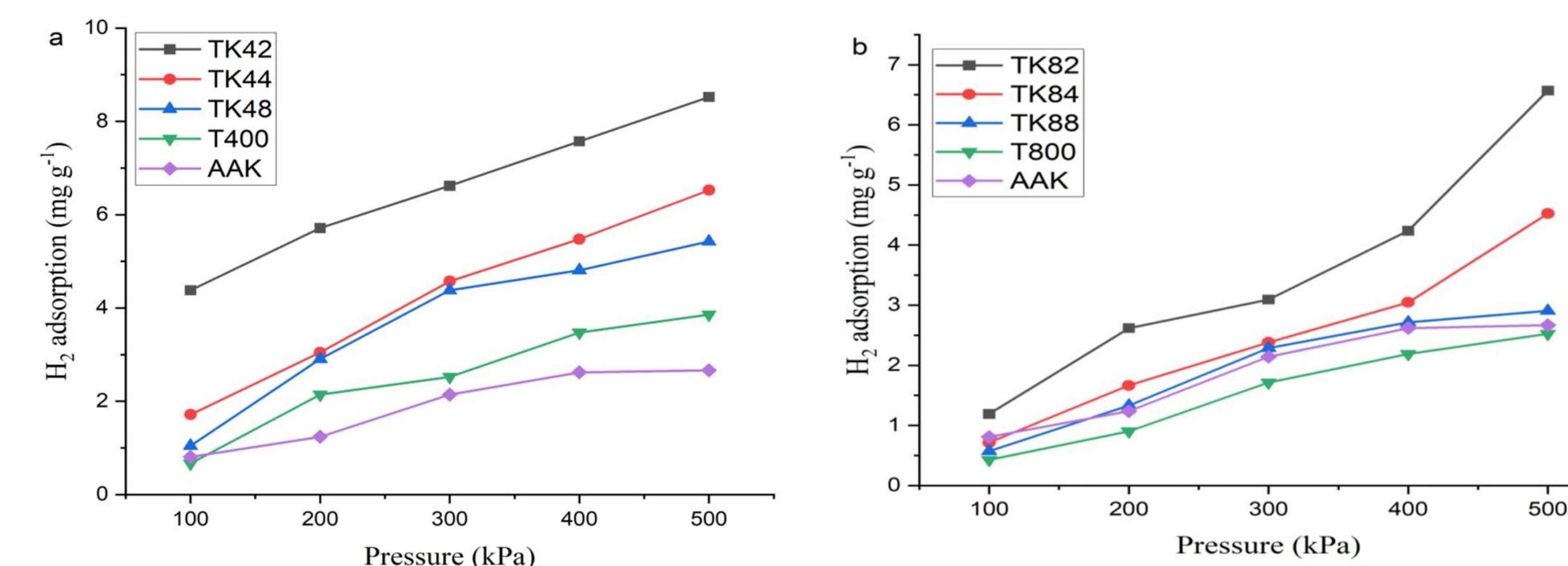
Porosimetry

Sample	Surface area (m ² g ⁻¹)
T400	250.369
TK42	357.807
TK44	304.386
TK48	284.119
T800	221.186
TK82	350.557
TK84	305.998
TK88	257.090
AAK	243.360

SEM analysis



Performance test



REFERENCES

- 1.Sharma S, Agarwal S and Jain A 2021 Significance of hydrogen as economic and environmentally friendly fuel. *Energies (Basel)* 14: 1–28.
- 2.Majeed Y, Khan MU, Waseem M, Zahid U, Mahmood F, Majeed F, Sultan M and Raza A 2023 Renewable energy as an alternative source for energy management in agriculture. *Energy Rep.* 10: 344–359.

Conclusion

- ❖ Nanocomposites were observed to have enhanced surface properties suitable for adsorption process.
- ❖ TK42 was observed to have the highest adsorption capacity at 500 kPa and 298 K compared to other adsorbents in this study.
- ❖ Freundlich isotherm model fitted: Multilayer adsorption on heterogeneous surfaces.