Outstanding Young Chemist Award 2021

Winner Showcase Webinar

MALAYSIAN YOUNG CHEMISTS NETWORK

INSTITUT KIMIA MALAYSIA

Date: Thursday, 19 May 2022
Time: 3 PM - 4 PM MYT
Mode: Virtual

Registration
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Universiti Sains Malaysia

IKM Outstanding Young Chemist Award 2021 Winner (Academic)

UNIVERSITI SAINS MALAYSIA

Green Synthesis Strategies and Advances in Nanosized Zeolites

Nanosized zeolites have been fascinating the world of science during the last two decades due to their unique properties. The reduction of zeolite size from micrometer to nanometer scale leads to substantial changes in their properties and thus it is expected to provide materials with completely new properties. This presentation will give a vivid look on the use of various techniques for synthesis of zeolite nanocrystals with controlled size, stability, morphology and possibility for increased crystalline yield and scale up processes. Green strategies for preparation of zeolites including direct transformation of natural sources into synthetic zeolites, template-free low temperature synthesis, seeded growth, multi-step, microwave-assisted, ultrasonic-assisted and ionothermal synthesis approaches will be presented. Besides, the new developments in zeolite synthesis are expected to broaden their applications in the fields of green and fine chemicals, medicine, pharmaceutical and food industry and nanotechnology.

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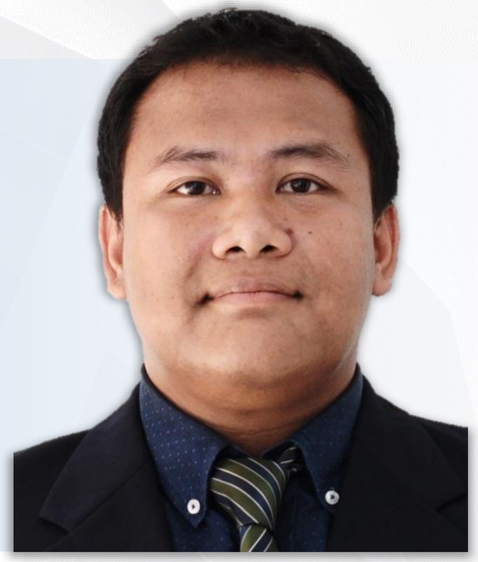

Ts ChM Dr Khalisanni bin Khalid

Malaysian Agricultural Research and Development Institute (MARDI)

IKM Outstanding Young Chemist Award 2021 Winner (Industry)

Flexible Nanoparticle Catalysis in the Reaction of Piperidine with Phenyl Salicylate Ions (PSa-)

The effects of phenolate and its substituted ions on cationic micellar growth involving different alkyl substituted phenolate salts, MX and CTABr micelles in aqueous system were determined with the interest of investigating the relationship of ion-exchange constant to the micellar aggregation behavior. By the use of psedophase micellar model, the value of micellar binding constant, (K_S) of PSa^- or PS^- was determined in the absence and presence of inert salt. The non-linear least squares calculated value of K_S^0 (K_S in the absence of inert salt) was found to be $6748 \pm 435\ M^{-1}$. This is the first study which describes the use of PSa^- as a probe molecule to determine the values of R_X^{Br} or K_X^{Br} by using a semi-emperical spectrophotometric (SESp) method. The use of R_X^{Br} refers to the relative binding constant value where the K_{Br} value of spherical micelles is used as a reference (denominator value is the binding constant of spherical micelles) and K_X^{Br} is refers to ion exchange constant value of nanoparticle aggregates (spherical/ wormlike/ vesicle). Since bromide ion has been considered as a reference counterion to determine binding constant of other counterions, the catalytic effects of CTABr/NaX/H_2O (X=Br, Cl) flexible nanoparticle catalysts on rate constant were investigated at [PS^-] = 0.2 mM, [NaOH] = 30 mM, [Pip] = 100 mM at different [CTABr]. The results revealed that the values of k_{obs} at [NaX]=0 and 6 mM ≤ $[CTABr]_T$ ≤ 10 mM were ten times smaller than the value of k_{obs} at $[CTABr]_T$=[NaX]=0 (X=Br, Cl). The investigation of the effects of substituted phenolate ions on cationic micellar growth were carried out for sodium phenolate (C_6H_5ONa), 2-ethyl sodium phenolate (2-ethyl C_6H_4ONa), 3-ethyl sodium phenolate (3-ethyl C_6H_4ONa), 4-ethyl sodium phenolate (4-ethyl C_6H_4ONa), 2-propyl sodium phenolate (2-propyl C_6H_4ONa), 4-propyl sodium phenolate (4-propyl C_6H_4ONa), 3-isopropyl sodium phenolate (3-isopropyl C_6H_4ONa) and 4-isopropyl sodium phenolate (4-isopropyl C_6H_4ONa) at [PS^-] = 0.2 mM, [NaOH] = 30 mM, [Pip] = 100 mM, [CTABr] = 6, 10 and 15 mM respectively at 35°C. The R_X^{Br} values of counterions were 6.3, 24.0, 24.4, 32.3, 66.3, 145.9, 60.8 and 66.6 for phenolate ions ($C_6H_5O^-$), 2-ethyl phenolate ions (2-etyl $C_6H_4O^-$), 3-ethyl phenolate ions (3-ethyl $C_6H_4O^-$), 4-ethyl phenolate ions (4-ethyl $C_6H_4O^-$), 2-propyl phenolate ions (2-propyl $C_6H_4O^-$), 4-propyl phenolate ions (4-propyl $C_6H_4O^-$), 3-isopropyl phenolate ions (3-isopropyl $C_6H_4O^-$) and 4-isopropyl phenolate ions (4-isopropyl $C_6H_4O^-$) respectively. By means of the correlation between R_X^{Br} values and rheological analysis with the evident of microscopic studies at [CTABr] = 15 mM, the microstructures of micellar self assembly of flexible nanoparticles were found as follows for $C_6H_5O^-$ = spherical, 2-ethyl $C_6H_4O^-$ = spherical, 3-ethyl $C_6H_4O^-$ = spherical, 4-ethyl $C_6H_4O^-$ = wormlike, 2-propyl $C_6H_4O^-$ = vesicle, 4-propyl $C_6H_4O^-$ = rodlike, 3-isopropyl $C_6H_4O^-$ = vesicle and 4-isopropyl $C_6H_4O^-$ = wormlike. The findings revealed the increase of R_X^{Br} values lead to the changes of spherical micelles to wormlike, rodlike or vesicles micelles.

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