Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
CHÉ 457-1 Glass Technology

Time: One (01) hour

Total 05 questions
Answer <u>four (04)</u> questions only

01) i. What is the *classic definition* of glass? What are considered as *the two prime assets* of glass?

ii. Give a schematic representation to show the *variation of specific volume as a function of temperature* for a liquid that forms a glass on cooling and one that forms a crystalline solid.

iii. Distinguish the difference between the structures of *oxide glass* and *crystalline oxide,* in terms of coordination polyhedra of cations.

(25 marks)

02) i. State the four main rules by which Zachariasen summarized his findings in 1932 to emphasize how the structure of SiO_2 glass differs from the crystalline form?

ii. Give two examples for each of these categories; *network formers, network modifiers* and *intermediates.*

iii. Make a rough sketch to show how network modifiers in glass cause nonbridging O ions.

(25 Marks)

03) i. What is the typical composition of commercial glass? What are the disadvantages of SiO_2 glass?

ii. What is the most common fluxing agent (modifier) in glass manufacturing? Name four disadvantages of the modified glass.

iii. What is *devitrification*? What is the main chemical compound used to reduce devitrification in glass manufacturing?

(25 Marks)

04) i. List minor ingredient categories used in glass technology and the most common chemicals used under each category. Explain the chemical reaction of the main minor ingredient addition.

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ii. What is the optimum temperature of glass required to start bottle manufacturing? Explain why bottles cannot be produced at temperatures higher or lower than this.

iii. What is *annealing*? Describe the industrial process of doing annealing.

(25 Marks)

05) i. What is *gob*? Describe why gob is important.

ii. What is *Parison*? Describe the nature of it.

iii. Explain *Blow and Blow* production process.

(25 Marks)