Department of Forest Products Technology

PUU-28.4001 WOOD MODIFICATION

Examination date 6th March 2008

1. Explain briefly the following terms: (6 marks)
   i. Fibre saturation point
   ii. Anti swelling efficiency
   iii. Weathering
   iv. Dimensional stability
   v. Impregnation modification

2. Answer both parts a) and b): (10 marks)
   a) After oven drying at 103 °C for 24 h, the weight of a small specimen of pine sapwood was measured and was found to be 1,566 g. After extraction in a mixture of solvents of differing polarity followed by a further cycle of oven drying the weight was found to have reduced to 1,488 g. A similar sized specimen of oven dried *un-extracted* wood taken from the same pine sapwood was measured and was found to weigh 1,678 g. The specimen was then chemically modified and after clean-up and oven drying for 24 h at 103 °C, was found to weigh 1,578 g. Assuming that the same amount of extractives were lost during the chemical modification reaction as were lost during the extraction process, calculate the WPG of the specimen. Show the calculation and state any assumptions made.
   b) A specimen of unmodified quarter sawn wood was oven dried at 103 °C to constant weight and its dimensions measured. The dimensions are shown in Table 1, below. The wood was then vacuum impregnated with water and submerged until it became totally saturated (i.e. > f.s.p.) and was then re-measured. The wet dimensions are recorded in Table 1 also. Another similar piece of wood was modified by an impregnation treatment. After modification, the modified wood was oven dried at 103 °C and its dimensions were measured. After vacuum impregnating in water to ensure that it was fully saturated, it was re-measured. The dry and wet dimensions of the modified wood are summarised in Table 1. Calculate: the swelling coefficients for modified and unmodified wood and the ASE of the modified wood. State any assumptions made and show the calculation.

Table 1: Dimensions of modified and unmodified wood

	OD dimensions before soaking			Dimensions after soaking		
	Longitudinal (mm)	Radial (mm)	Tangential (mm)	Longitudinal (mm)	Radial (mm)	Tangential (mm)
Unmodified	5,02	21,23	19,56	5,04	22,19	21,03
Modified	4,96	22,03	20,56	4,97	22,58	21,38

3. Write brief descriptions of the following: (12 marks)

a) Why modify wood?
b) Modification of wood by compression
c) How does wood modification differ from preservation treatment?

4. Discuss factors that affect the impregnation treatment of wood (10 marks)

5. Write an essay on **one** of the following: (12 marks)

Either

a) Thermal modification of wood

Or

b) How wood properties are affected by modification